DRAFT ENVIRONMENTAL IMPACT STATEMENT

# Mullica River Estuarine Sanctuary

Proposed Estuarine Sanctuary Grant Award
for Mullica River, Atlantic, Burlington,
and Ocean Counties, New Jersey



**U.S. DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
Office of Coastal Zone Management
and
State of New Jersey
Department of Environmental Protection
Division of Coastal Resources

UNITED STATES DEPARTMENT OF COMMERCE

# DRAFT ENVIRONMENTAL IMPACT STATEMENT

PROPOSED

GRANT AWARD TO THE STATE OF NEW JERSEY

FOR THE

MULLICA RIVER ESTUARINE SANCTUARY

MAY 1981

Prepared by:
U.S. Department of Commerce
National Oceanic and Atmospheric
Administration
Office of Coastal Zone Management
3300 Whitehaven Street, N.W.
Washington, D.C. 20235

and

State of New Jersey
Department of Environmental
Protection
Division of Coastal Resources
CN 401
Trenton, New Jersey 08625

DESIGNATION: Draft Environmental Impact Statement

TITLE: Proposed Estuarine Sanctuary Grant Award to the State of New Jersey for a Mullica River Estuarine Sanctuary

ABSTRACT: The New Jersey Department of Environmental Protection has applied for a grant from the Office of Coastal Zone Management to establish an estuarine sanctuary in the Mullica River system in Atlantic, Burlington, and Ocean Counties.

The proposed sanctuary, which will be established through a two-phase land acquisition program, will preserve, protect and place under State management approximately 17,748 acres of the Mullica River drainage basin including saline freshwater and brackish wetlands, and forested uplands, all of which are currently privately owned. These areas, which include a broad diversity of salinity and physical systems, will be used for research, education and recreation purposes.

Approval of the grant application will permit the establishment of an estuarine sanctuary representing the Virginian biogeographic region. The proposed sanctuary will be used primarily for research and educational purposes, especially to provide information useful for coastal zone management decisionmaking. Multiple use of the sanctuary will be encouraged to the extent that the uses are compatible with the primary sanctuary purpose of long-term protection of the area for scientific research and educational use.

Research within the proposed sanctuary will provide baseline data useful for assessing the impacts of human activities within the Mullica River area and the Virginian biogeographic region.

APPLICANT: New Jersey Department of Environmental Protection

LEAD AGENCY: U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Office of Coastal Zone Management

CONTACT: Mr. Milton Martin
Estuarine Sanctuary Project Officer
Office of Coastal Zone Management
3300 Whitehaven Street, N.W.
Washington, D.C. 20235
(202) 653-7301

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# SUMMARY

## BACKGROUND

In response to the intense pressures upon and conflicts within the coastal zone of the United States, Congress enacted the Coastal Zone Management Act (CZMA) of 1972 (PL 92-583), with amendments enacted by the U.S. Congress in 1976 and 1980. The Act authorized a new Federal program--administered by the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce--to assist and encourage States to develop and implement comprehensive management programs for the resources of the coastal zone. The CZMA affirms a national interest in the coastal zone's effective management, beneficial use, and development, and it permits the awarding of grants for the purpose of meeting these ends.

Section 315 of the CZMA established the Estuarine Sanctuary Program, which, on a matching basis, provides grants to States to acquire, develop, and operate estuarine areas to be set aside as natural field laboratories. These areas will be used primarily for long term scientific and educational purposes, which, in addition to other multiple-use benefits, will provide information essential to coastal management decisionmaking. Examples of estuarine sanctuary purposes are:

- To gain a thorough understanding of ecological relationships within the estuarine environment;
- To make baseline ecological measurements;
- To serve as a natural control in order to monitor changes and assess the impacts of human stresses on the ecosystem;
- To provide a vehicle for increasing public knowledge and awareness of the complex nature of estuarine systems, their values and benefits to humans and nature, and the problems that confront them; and
- To encourage multiple use of the estuarine sanctuaries to the extent that such usage is compatible with the primary sanctuary purposes of research and education.

In order to ensure that the sanctuary program adequately represents regional and ecological differences, the programmatic guidelines establish a biogeographical classification scheme that reflects geographic, hydrographic, and biological characteristics.

The estuarine sanctuary guidelines, which were published in 1974, were amended in 1977 to specifically authorize the granting of 50 percent matching grants in three stages: (1) an initial planning grant for such preliminary purposes as surveying and assessing the lands to be acquired, and for developing management procedures and research programs; (2) a second grant for the actual acquisition of the land; and (3) subsequent grants for administration and operation of the established sanctuary.

In January 1981, the State of New Jersey, through the Department of Environmental Protection (DEP), submitted to the Office of Coastal Zone Management (OCZM) a preliminary acquisition grant application for funding assistance to establish an estuarine sanctuary in the Mullica River area of Burlington, Atlantic, and Ocean Counties. Subsequently, NOAA awarded a preliminary acquisition grant for $50,000 (matched by the State), which is being used for preliminary boundary determination, estimation of real estate costs and municipal property tax loss impact, development of a management plan, and research and education programs.

## PROPOSED ACTION

The State of New Jersey proposes to request a $1,149,440 grant from OCZM to be matched by $1,149,440 in State funds, for State acquisition (OCZM has no acquisition or condemnation authority) of approximately 6,884 acres of wetlands and uplands along the Mullica and Wading Rivers, New Jersey. This request represents the first phase of a two-phase program of land acquisition for which the State will request funding assistance from NOAA/OCZM. Phasing of the project will require that the State comply with established NOAA/OCZM regulations for submission of grant applications and National Environmental Policy Act requirements for environmental impact statements for each phase of the estuarine sanctuary project. The land will be acquired and managed by the New Jersey DEP with assistance from its Divisions of Fish, Game and Wildlife; and Parks, Forestry, and Green Acres, and a Sanctuary Advisory Committee. A background study, Estuarine Sanctuaries for New Jersey's Coastal Zone: A Report and Preliminary Recommendations* (May 1980), of the proposed sanctuary area has been prepared by DEP's Division of Coastal Resources is available from the Coastal Information Center, CN 401, Trenton, N.J., 08625.

Multiple use of the sanctuary is encouraged as long as it is compatible with National Estuarine Sanctuary Program objectives. Multiple sanctuary uses mean the simultaneous utilization of an area or resource for a variety of compatible purposes or to provide more than one benefit. Sanctuary uses may include low-intensity recreation, hunting, fishing, and wildlife observation.

Examples of non-compatible uses of the sanctuary include, but are not limited to: diking, dredging or manipulative research with long-term negative impacts. Uses that will be allowed, but monitored for potential impact are consumptive uses of the environment, such as the collection of flora and fauna for public use and benefit.

Adjacent land and water usage will have impacts upon the proposed sanctuary. However, these activities are currently monitored by existing Federal, State, and local authorities, which will continue to do so. The estuarine sanctuary will not affect land or water use planning within Burlington, Atlantic or Ocean Counties outside the boundaries of the proposed sanctuary. In addition, there will be no Resource Protection Zone (RPZ) established around the proposed estuarine sanctuary, since each proposed acquisition area is fringed by forested uplands which serve as buffers.

* by Richard A. Kantor
New Jersey DEP

Since existing State statutes and regulations appear fully adequate to address any potential problems resulting from uses within the sanctuary and in adjacent waters and lands, designation of the sanctuary will not result in the need for new or additional environmental regulations or creation of a new State agency, or a new division within existing agencies.

The sanctuary is to be used for research and education, which implies a multidisciplinary approach to management. It will be managed by DEP with the advice of an Estuarine Sanctuary Advisory Committee and Research and Education Subcommittees. The Advisory Committee membership, which will be appointed by the Commissioner of the New Jersey DEP, will include, but not be limited to, the following: representatives of the State of New Jersey, colleges and universities, government agencies with responsibilities in or near the Sanctuary area, and environmental or civic groups or individuals with relevant expertise.

NOAA/OCZM will participate actively with DEP and the Advisory Committee, in its role as an ex officio member of the Committee. The Assistant Commissioner for Natural Resources of DEP, or a representative of the Assistant Commissioner, will be Chairman of the Advisory Committee.

## ALTERNATIVES

Alternative management structures were considered. Management by a single State agency would make administration less complex and would be appropriate for the diverse types of wetlands and forested lands to be administered. Complex management committee schemes or the creation of new agencies were rejected in favor of management by DEP, which includes two Divisions with long histories of experience in management of public wetlands and forested lands, and a Sanctuary Advisory Committee.

## ENVIRONMENTAL CONSEQUENCES

The most direct environmental consequence of the proposed action will be the long term preservation of the area and its resources in their natural state for scientific and educational uses. The sanctuary will enable increased research and education to take place which will enhance the knowledge and understanding of estuarine systems in New Jersey and, therefore, will provide information for improved coastal zone resource decisionmaking.

Positive environmental impacts will include:

- preservation of essential wetland habitats that have national significance and are in limited supply;
- fish and wildlife habitat preservation, including the maintenance and enhancement of fish breeding species that are important economically to commercial fishing;
- improved air quality from the limiting of urbanization within the sanctuary boundaries;

- water quality improvement from the limiting of urbanization;
- increased public usage through the conversion of private land increased but controlled access; and,
- additional scientific, research, and educational opportunities for students, educators, and scientists, which will also bring economic benefits to the region.

In the first phase of this proposal, negative impacts would include removal of approximately $1,959,500 from the local tax bases and an annual loss of approximately $61,656 in municipal property taxes. In total, approximately $5,097,000 could be removed from the municipal tax bases and approximately $163,000 could be lost from municipal property taxes when the second phase of this proposal is completed.

This will be mitigated by compensatory payments by the State, gradually decreasing over a thirteen year period, as mandated by the New Jersey Green Acres and Recreation Opportunities Bond Act of 1974 (N.J.S.A. 13:8A-1 et seq.).

# PART I: PURPOSE OF AND NEED FOR ACTION

In response to the intense pressures to preserve, protect, develop, and where possible, to restore or enhance coastal resources in the vitally important coastal zone of the United States, Congress passed the Coastal Zone Management Act (CZMA), which was signed into law on October 27, 1972 (P.L. 92-583), and amended in 1976 and 1980. The CZMA authorized a Federal grant-in-aid and assistance program to be administered by the Secretary of Commerce, who in turn delegated this responsibility to the Office of Coastal Zone Management (OCZM) of the National Oceanic and Atmospheric Administration (NOAA).

The CZMA affirms a national interest in the effective protection and development of the Nation's coastal zone, and provides assistance and encouragement to coastal States (including those bordering the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and U.S. territories) to develop and implement State programs for managing their coastal zones. The Act established a variety of grant-in-aid programs to such States and Territories for the purposes of:

- o developing coastal zone management programs (Sec. 305);
- o implementing and administering management programs that receive Federal approval (Sec. 306);
- o avoiding or minimizing adverse environmental, social, and economic impacts resulting from coastal energy activities (Sec. 308);
- o coordinating, studying, planning, and implementing interstate coastal management activities and programs (Sec. 309);
- o conducting research, study, and training programs to scientifically and technically support State coastal management programs (Sec. 310); and,
- o acquiring estuarine sanctuaries and island preservation (Sec.315).

The estuarine sanctuary program authorized by Section 315 of the CZMA establishes a program to provide grants to States, on a matching basis, for the acquisition, development, and operation/management of natural estuarine areas as sanctuaries so that scientists and students may be provided the opportunity to examine, over a period of time, the ecological relationships within the area. Section 315 provides a maximum of $3,000,000 in Federal funds, to be matched by an equivalent amount by the State, to acquire and manage lands for each sanctuary. Guidelines for implementation of the estuarine sanctuary program were published in final form on June 4, 1974, (15 CFR Part 921, Federal Register 39 [105]: 19922-19927) and amended on September 9, 1977 (15 CFR Part 921, Federal Register 42 [175]: 45522-45523).

Sanctuaries established under this program have the dual purpose of (1) preserving relatively undisturbed areas so that a representative series of natural coastal estuarine systems will always remain available for ecological research and education, and (2) ensuring the availability of natural areas for use as a control against which impacts of human activities in other areas can be assessed. These sanctuaries are to be used primarily for long term scientific and educational purposes, especially to provide information essential to coastal zone management decisionmaking.

Such purposes may include:

- gaining a thorough understanding of the natural ecological relationships within the variety of estuarine environments of the United States;
- making baseline ecological measurements;
- serving as a natural control against which changes in other similar estuaries can be measured, and facilitating evaluation of the impacts of human activities on estuarine ecosystems;
- providing a vehicle for increasing public knowledge and awareness of the complex nature of estuarine systems, and their values and benefits to man and nature; and,
- encouraging multiple use of the estuarine sanctuaries to the extent that such usage is compatible with the primary sanctuary purposes of research and education.

While the primary purpose of estuarine sanctuaries is scientific and educational, multiple use of estuarine sanctuaries will be encouraged to the extent it is compatible with the primary sanctuary purpose. These uses may generally include such activities as low intensity recreation, fishing, hunting, and wildlife observation.

The CZMA and the sanctuary guidelines express the intent that ultimately the estuarine sanctuary program will fully represent the variety of regional and ecological differences among estuaries. The regulations indicate that "the purpose of the estuarine program... shall be accomplished by establishing a series of estuarine sanctuaries nationwide which will be designated so that at least one representative of each estuarine ecosystem will endure into the future for scientific and educational purposes" (15 CFR 921.3[a]). As administered by OCZM, the estuarine sanctuary program defines 11 different biogeographic provinces or classifications, based on geographic, hydrographic, and biologic characteristics. Subcategories of this basic system will be used as appropriate to distinguish major subclasses of each biogeographic province. The total number of sanctuaries that will be needed to provide minimal representation for the nation's estuarine ecosystems is currently under study.

Between 1974 and the present, OCZM has awarded grants to establish nine estuarine sanctuaries. These are:

| Sanctuary | Biogeographic Classification |
|---|---|
| South Slough<br>Coos Bay, Oregon | Columbian |
| Duplin River<br>Sapelo Island, Georgia | Carolinian |
| Waimanu Valley<br>Island of Hawaii, Hawaii | Insular |
| Rookery Bay<br>Collier Co., Florida | West Indian |
| Old Woman Creek<br>Erie Co., Ohio | Great Lakes |
| Apalachicola River and Bay<br>Franklin Co., Florida | Louisianian |
| Elkhorn Slough<br>Monterey County, California | Californian |
| Padilla Bay<br>Skagit Co., Washington | Columbian |
| Narragansett Bay<br>Newport Co., Rhode Island | Virginian |

Mullica River has long been a focal point of research and educational interests and in recent years its future has been the object of considerable research attention. Responding to these interests, the New Jersey DEP nominated Mullica River as an estuarine sanctuary site and applied to OCZM for pre-acquisition funding, which was granted in March 1981.

The proposed Mullica River Sanctuary will be representative of a major estuarine sanctuary within the Virginian Biogeographic Classification, subcategory and the second estuarine sanctuary within this region. This addition further completing the National Estuarine Sanctuary System as provided for in Section 315 of the CZMA.

# PART II: ALTERNATIVES

## A. Preferred Alternative

OCZM has implemented a process whereby a land acquisition grant can be made in two steps. The first is a preliminary acquisition grant for such purposes as real estate appraisals, the development of management procedures, and research/educational programs. OCZM awarded such a grant for Mullica River in March 1981. The second step is the grant request for Federal funding for the actual acquisition of land, the proposed action for which this DEIS is prepared.

The State of New Jersey is proposing to submit a land acquisition grant application for $2,298,800, $1,149,400 from OCZM, to be matched by $1,149,400 in State funds and/or resources, to establish an estuarine sanctuary on the Mullica River Basin in Burlington, Atlantic and Ocean Counties. The grant will enable New Jersey to acquire approximately 6,884 acres, all of which is now privately owned, as a first phase of a two phase land acquisition program to establish the proposed estuarine sanctuary.

The second phase of the acquisition of 10,864 acres in Atlantic and Burlington Counties, will be proposed in the following Federal fiscal year, FY 1982. The land will be acquired and managed by DEP.

The approval of future funding requests is conditioned upon the successful completion of the Estuarine Sanctuary Procedural Guideline requirements by the State, the National Environmental Policy Act requirements, and the availability of NOAA/OCZM funds.

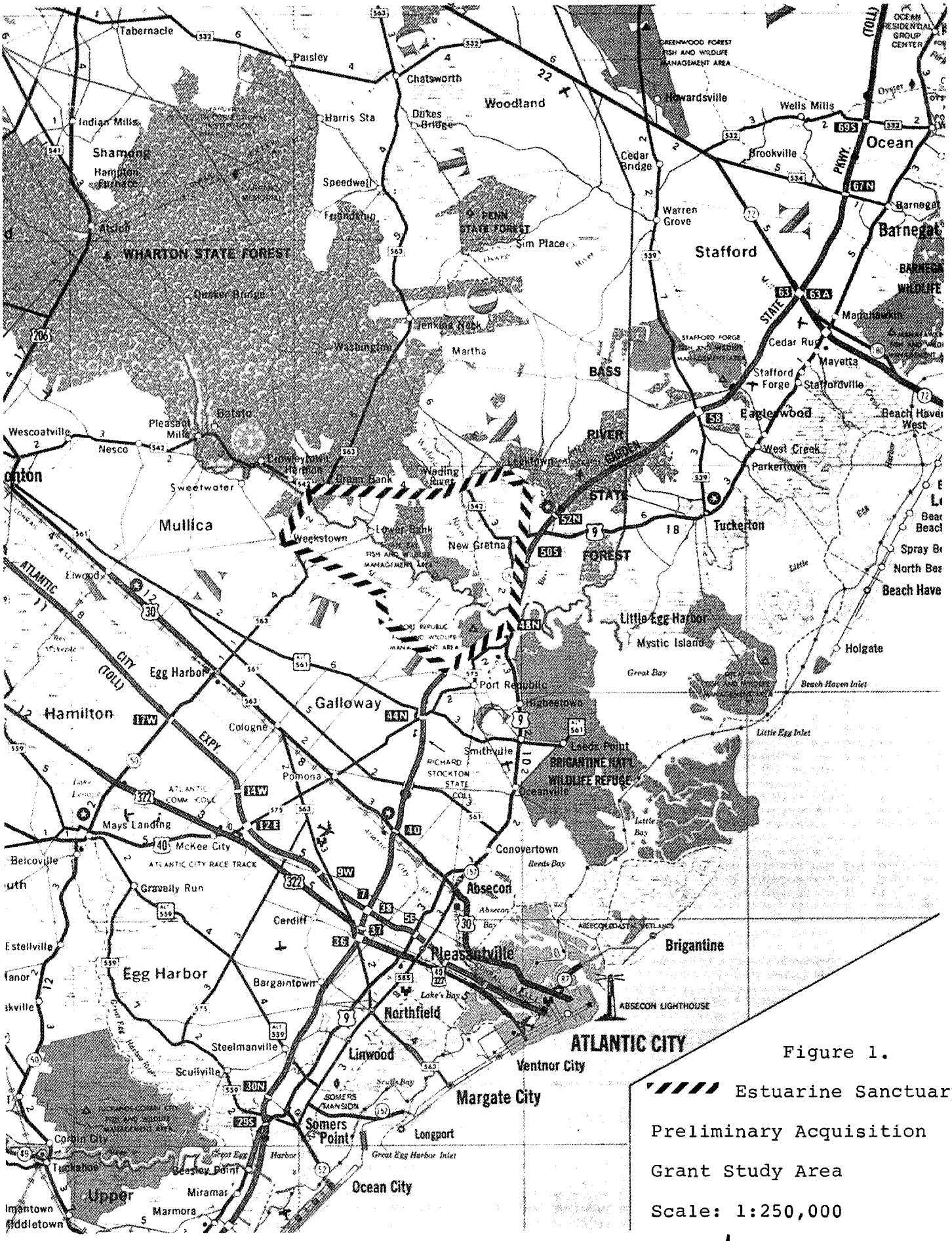
Upon award of the acquisition grant, the State has the option of applying for matching operational funds ($50,000 per year for up to five years).

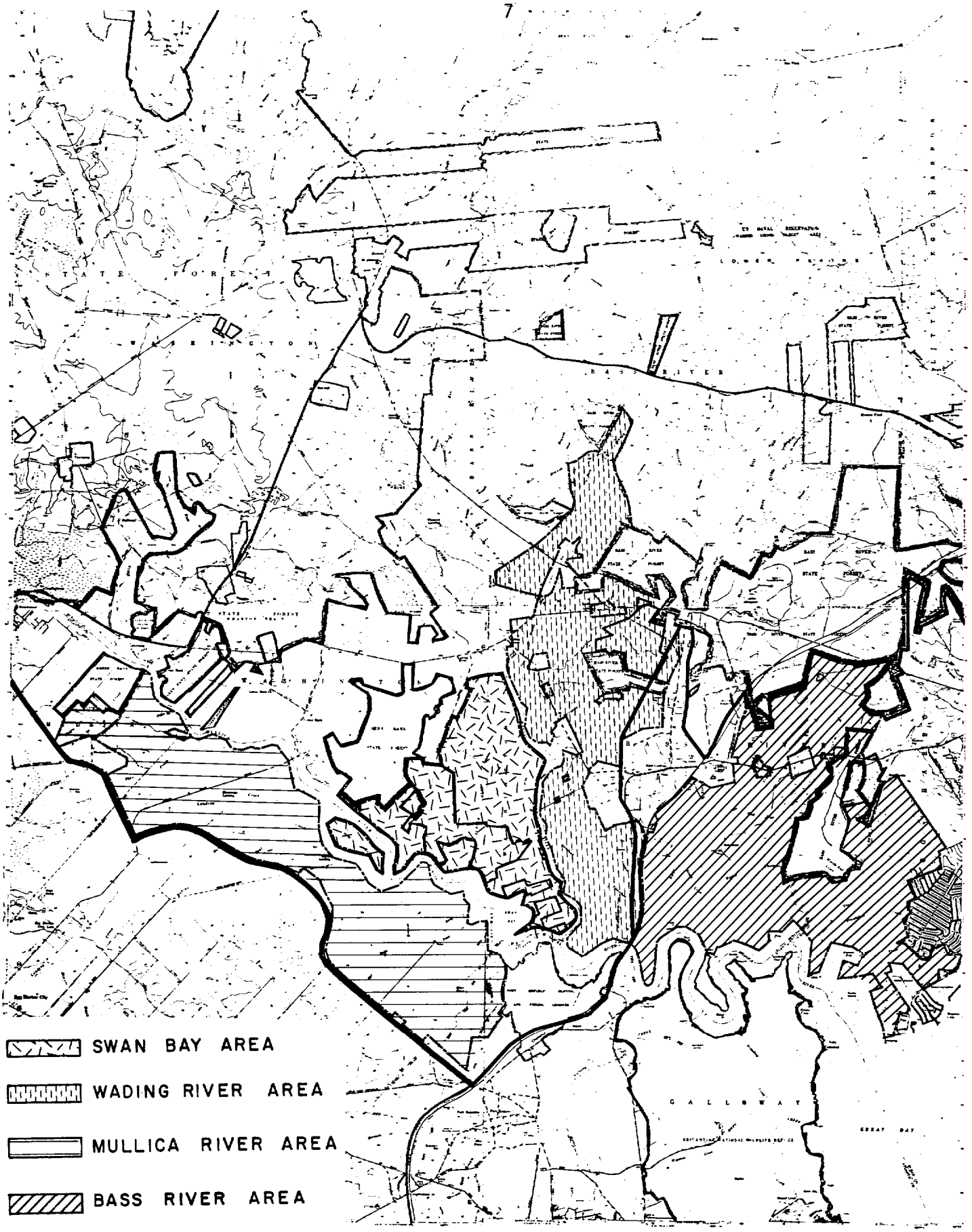
### 1. Site Boundaries

Figure 1 indicates the general location of the proposed project and Figure 2 delineates the proposed sanctuary boundaries. The sites included in the proposal are described below.

#### a. Swan Bay

The Swan Bay area is the State's top priority acquisition site, and is estimated to cost $500,000. This 2,065 acre area is being purchased by the State, with funds provided by the U.S. Department of the Interior through Land and Water Conservation Funds (LWCF) and by DEP's Division of Parks, Forestry, and Green Acres through State Green Acre Funds. This action will add to the existing 1,078 acres of the Swan Bay State Fish and Wildlife Management Area which is presently administered by the DEP's Division of Fish, Game, and Wildlife, forming a contiguous area of 3,143 acres. In the unlikely event that Federal LWCF funds are not available, OCZM funds will be requested to implement the proposed purchase (see Figure 5).


Tabernacle
Paisley
Chatsworth
Woodland
Howardsville
Wells Mills
Ocean
Indian Mills
Shamong
Hampton Furnace
Harris Sta
Dukes Bridge
Cedar Bridge
Brookville
Speedwell
Friendship
Atsion
WHARTON STATE FOREST
PENN STATE FOREST
Sim Place
Warren Grove
Stafford
Barnegat
Quaker Bridge
Jenkins Neck
Washington
Martha
BASS
Cedar Run
Mayetta
Stafford Forge
Staffordville
Eagleswood
Beach Haven West
Batsto
Pleasant Mills
Wescoatville
Nesco
Leektown
Wading River
Green Bank
Sweetwater
RIVER
West Creek
Parkertown
Mullica
Weekstown
Lower Bank
New Gretna
STATE FOREST
Tuckerton
Spray Beach
North Beach
Beach Haven
ATLANTIC CITY (TOLL) EXPY
Egg Harbor
Little Egg Harbor
Mystic Island
Holgate
Great Bay
Beach Haven Inlet
Port Republic
Galloway
Hamilton
Higbeetown
Cologne
Leeds Point
Little Egg Inlet
Smithville
BRIGANTINE NAT'L WILDLIFE REFUGE
Pomona
Oceanville
Mays Landing
McKee City
Conovertown
Belcoville
ATLANTIC CITY RACE TRACK
Gravelly Run
Absecon
Cardiff
Estellville
Egg Harbor
Pleasantville
Brigantine
Bargaintown
Northfield
ABSECON LIGHTHOUSE
ATLANTIC CITY
Steelmanville
Linwood
Ventnor City
Scullville
Margate City
SOMERS MANSION
Somers Point
Longport
Great Egg Harbor Inlet
Corbin City
Tuckahoe
Beesley Point
Ocean City
Upper
Miramar
Marmora
Figure 1.
Estuarine Sanctuary
Preliminary Acquisition
Grant Study Area
Scale: 1:250,000
North




(See Map Insert)

Figure 2

The authority to administer State Fish and Wildlife Management Areas is found in N.J.S.A. 23:1-1 et seq.; implementing regulations are found in N.J.A.C. 7:25-2.1 et seq. Appendix 3 is a copy of the adopted Rules and Regulations of general uses of State Fish and Wildlife Management areas under N.J.A.C. 7:25- 2.1 et seq.

b. Wading River

The proposed land acquisition through the National Estuarine Sanctuary Program of the east side of the Wading River in Bass River Township is proposed for administration by DEP through the Sanctuary Advisory Committee and the Divisions of Parks, Forestry and Green Acres, State Park Service. Figure 2 identifies the Wading River site location and its physical relationship to Swan Bay, the other Phase I acquisition area to be acquired. Figure 6 identifies the Wading River area proposed boundaries.

c. The Mullica River Area

This proposed land acquisition through the National Estuarine Sanctuary Program, on the south side of the Mullica River in Galloway and Mullica Township and Port Republic and Egg Harbor City, is proposed for administration by DEP through the Sanctuary Advisory Committee and the Divisions of Fish, Game and Wildlife, and Parks Forestry and Green Acres. See Figure 2 for the location of the Mullica River area and Figure 7 for the specific boundary of this Phase II acquisition area.

d. Bass River Area

This proposed land acquisition through the National Estuarine Sanctuary Program is for lands adjacent to the Bass River in Bass River Township and Little Egg Township in Ocean County. This site's location within the proposed sanctuary area is given in Figure 2. The specific Bass River Area boundary is given in Figure 8. This is a phase II area acquisition.

2. Proposed Management of the Estuarine Sanctuary

A study regarding the proposed estuarine sanctuary: Estuarine Sanctuaries For New Jersey's Coastal Zone: A Report and Preliminary Recommendation, May 1980, was prepared by the State of New Jersey during the first and second year of State implementation of their coastal zone management program. Information from this document has been incorporated extensively into the DEIS and within this document shall be referred to as "Kantor (1980)."

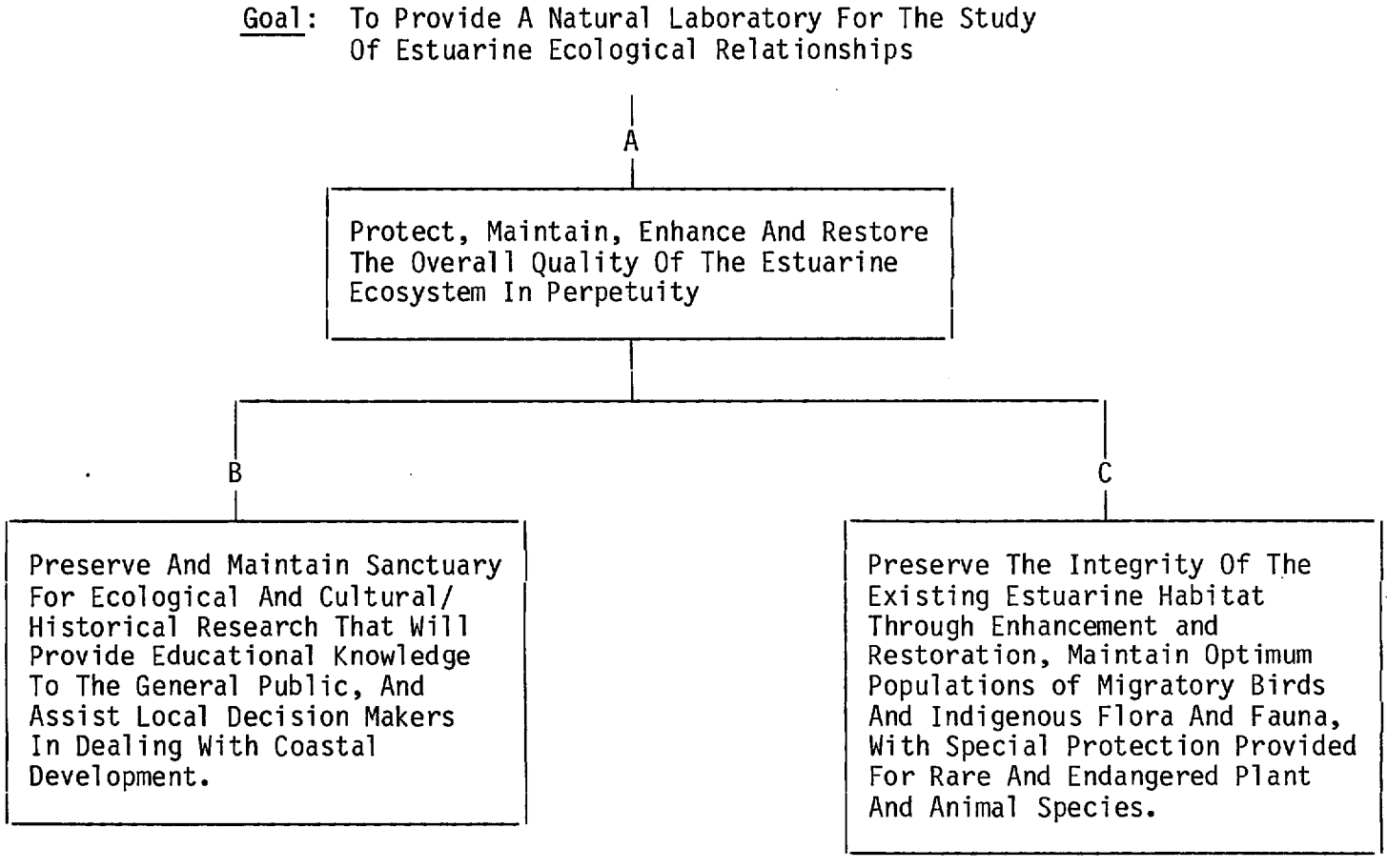
Multiple use of an estuarine sanctuary may be permitted as long as it does not interfere with the primary purposes of providing long term protection for natural areas so they may be used for scientific and educational purposes. While it is anticipated that compatible uses may generally include activities such as low intensity recreation, fishing, hunting etc., it is recognized that the exclusive use of an area for scientific or educational purposes may provide the optimum benefit to coastal zone management and resource use and on occasion be necessary.

Some of the popular recreational activities in the river include, but are not limited to: shellfishing, hunting, trapping, boating, birdwatching, photography, etc. At the present time, these activities are limited because of poor and unreliable access, most of which is through private lands. These uses would be encouraged by increasing the number of access areas available to the general public.

The advantages and disadvantages associated with the provision of public access will be considered, particularly the potential impacts upon the fish, vegetative and wildlife resources and private property owners. Legal constraints will need to be explored, and associated problems such as vehicle parking, access control methods and enforcement, and other administrative factors will be evaluated. The provision of access shall not interfere with adjacent property owners' rights, or affect usage of their property.

FIGURE 3

OBJECTIVES OF THE MULLICA RIVER ESTUARINE SANCTUARY PROGRAM



Examples of incompatible uses in the estuarine sanctuary are residential or commercial development; mineral extraction; timber harvesting; off-road vehicle use; diking, dredging, drainage, or otherwise altering the natural system, or causing disturbances within it (e.g. loud noise or littering). Manipulative research involving the long term degradation or alteration of the natural resource will also be prohibited. Short term manipulative research consistent with the research/education intent of the sanctuary may be allowed, but only under strict controls and with written approval of the Sanctuary Advisory Committee and DEP.

Examples of activities that will be monitored and controlled include, but are not limited to, consumptive uses of the environment, such as the collection of flora and fauna, and access as described above.

The potential exists through the goals of research and education in the Estuarine Sanctuary Guidelines for restoring natural ecosystem functions to certain parts of the sanctuary that may have been altered by past activities. Restoration may require positive actions in some cases; in other situations, removal of existing threats or conflicts may accomplish the same end. Any change in the existing system, including areas previously modified, will only be done after scientific evaluation of the consequences to the system over the long term.

a) General Management Principles

The Estuarine Sanctuary Program is not a new State or Federal regulatory program. The principal objective will be to protect and utilize the proposed estuarine sanctuary as a natural field laboratory for long term scientific and educational purposes, which, in addition to other multiple use benefits, will provide information and data essential to coastal management decision-making. The proposed management system for the estuarine sanctuary will be administrated by the New Jersey DEP consistent with existing Federal and State statutes and Estuarine Sanctuary Program purposes.

The management responsibility, which is vested in DEP for the proposed sanctuary, similar to all other public lands managed by DEP, will be assigned to the NJDEP Assistant Commissioner for Natural Resources, who will consider management recommendations by the Estuarine Sanctuary Advisory Committee. Members will be appointed by the Commissioner of DEP. The committee will meet on a quarterly basis or as determined by the committee staff.

The role of the Advisory Committee will be to:

1. Review and act upon recommendations made by the Research and Education Subcommittee in the development, and implementation of a sanctuary management plan and the research and education programs.

2. Assist and work with the DEP and the on-site sanctuary manager in the day-to-day management of the sanctuary.

3. Develop and implement a program of sanctuary public relations with the general public.

4. Review and advise the Assistant Commissioner of DEP on proposed future revisions of the management plan and research and education programs.

5. Foster scientific research and education programs within the sanctuary.

6. Foster ecological understanding and appreciation of the Mullica River Drainage Basin resources and their proper management.

Sanctuary management objectives will be:

- To gain a thorough understanding of ecological relationships within the estuarine environment;
- To make baseline ecological measurements;
- To serve as a natural control area in order to monitor changes and assess the impacts of human stresses on the ecosystem;
- To provide a vehicle for increasing public knowledge and awareness of the complex nature of estuarine systems and of their values and benefits to humans and nature, and the problems that confront them; and
- To encourage multiple use of the estuarine sanctuaries to the extent that such usage is compatible with the primary sanctuary purposes of research and education.

A full-time on-site manager will be employed by, and responsible to DEP, and will be housed in the appropriate existing DEP field office adjacent to the acquisition area, or in a new on-site facility.

The duties of the Sanctuary Manager who will have the qualifications of a resource manager will include, but not be limited to:

- Serving as staff to the Sanctuary Advisory Committee;
- Administering the sanctuary, assisting in the preparation required to develop State and Federal grant applications, proposals, budgets, and reports and maintaining necessary records;
- Representing the Sanctuary Advisory Committee in public meetings;
- Upon request, advising and coordinating units of government on particular issues, questions, or projects, and their impacts on or relationship to the sanctuary;
- Coordinating all special studies and research activities within or related to the sanctuary, and interpreting and applying research results to produce benefits of a general nature;

- Implementing the research and educational programs for the sanctuary;
- Reviewing all proposed activities within the sanctuary for consistency with the management objectives; and,
- Coordinating all projects and taking appropriate action on activities that might affect the sanctuary.

Uses that are compatible with the intent of establishing the estuarine sanctuary will be allowed and regulated under existing local, State and Federal statutes. Uses that would alter or destroy the value of the ecosystem will not be allowed within the sanctuary.

Acceptable and Prohibited Uses Within The Sanctuary:

Acceptable Uses:

- Sport and commercial fin fish and shellfish harvesting
- Hunting and trapping
- Boating and navigation (motor, sail or hand powered)
- Swimming and skin diving
- Nature study, wildlife observation and photography
- Maintenance dredging in existing navigation channels

Prohibited Uses:

- Wetlands filling to create uplands
- Wetlands or uplands dredging to create new navigation channels
- Dumping or disposal of dredging spoils
- Alteration of water circulation patterns
- Any activity that could lead to significant degradation of water quality or biological productivity
- Solid, liquid, or hazardous substance waste disposal of any type
- Upland, wetland, or subaqueous sand or gravel extraction
- Surface water outfalls or intakes
- Timber harvesting and vegetation clearing

b) Research and Education Program

The principal objective of the research program for the Estuarine Sanctuary will be to provide scientific information to State and Federal decisionmakers on estuarine ecology and physical environment necessary for the proper management of coastal marine and estuarine resources. The second objective will be to direct research toward the estuary as an ecological whole. Coordination of research projects is most desirable and is proposed to be implemented by DEP with the assistance of a Research sub-committee and the Sanctuary Advisory Committee.

Procedures for conducting research within the proposed sanctuary will be based upon a modification of the procedural policies adopted under the Natural Areas System Act (N.J.S.A. 13:1B-15.1) as N.J.A.C. 7:2-11.6. These adopted procedures, revised to be appropriate for the estuarine sanctuary, follow:

Sanctuary Management Procedures for Conducting Research

(A) Persons permitted to enter into or upon [a natural area] the Mullica River Estuarine Sanctuary* for the purpose of conducting research shall be limited to individuals who in the opinion of the Department of Environmental Protection, and the Estuarine Sanctuary Advisory Committee, are qualified to carry through such scientific purposes and/or whose research will not cause detrimental effects to the biotic types found in the area.

(B) A written proposal for research within the estuarine sanctuary (a natural area) shall be submitted to the Department for approval. The proposal shall contain the following:

1. topic of project and species concerned,
2. methods and procedures for carrying out the project,
3. location of research site(s),
4. duration of project,
5. frequency of visitation, and
6. number of persons involved.

(C) The permittee shall coordinate his/her project with the Sanctuary Advisory Committee and Manager, and no less than once a year shall report in writing on the status of the research to the Department.

(D) Upon completion of a project a copy of the research results shall be submitted to the Advisory Committee and Department and made available to the general public.

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* Brackets note deletions from and underlines note additions to the rules adopted for Natural Areas at N.J.A.C. 7:2-11.6

Coordinated and Projected Topics of Research

In order to promote coordination of scientific research within the proposed sanctuary and to foster better communication and coordination of estuarine research in other sites within the State, and in other coastal States, an Estuarine Sanctuary Research Subcommittee is proposed. The role of the Research Subcommittee will be to advise the Sanctuary Advisory Committee and DEP as to the desirability and potential environmental effects of proposed research projects. The Subcommittee is expected to meet at least quarterly each year, to review current projects, proposed research projects, and discuss environmental management informational needs.

The Estuarine Sanctuary Research Subcommittee will assist the Advisory Committee and DEP to insure that the sanctuary is not only protected through it's acquisition program and policies, but that it also creates a natural field laboratory which will be used to gather data and make studies of the natural and human processes occurring within estuaries of the coastal zone.

The subcommittee will be an advocate for research in the sanctuary. In addition, since the Estuarine Sanctuary Program does not provide direct funding for specific research projects, it is anticipated that support by the Research Subcommittee and Sanctuary Advisory Committee will lead to support from the public and the private sectors.

Creating an understanding of the coastal estuarine system of the Mullica River as an intergrated whole will be the prime objective of the proposed research program. Of particular significance to research within the proposed sanctuary are the following topics:

a) oyster seed bed ecology, production and conservation

b) migratory waterfowl ecology

c) water quality - maintenance of high quality Pine Barrens Cedar upland surface water

- groundwater/surface water quality and quantity and its effects on the salinity regime of the estuary

- maintenance of hard clam transplant (relay) planting areas

d) fin and shellfish nursery habitat with particular emphasis on white perch and blue claw crab

e) vegetative productivity

- estuarine/coastal marine detrital based food chains
- comparative ecology of saline, brackish and freshwater tidal coastal wetlands communities

f) Estuarine nutrient cycling in low (pristine) nutrient system

- Natural estuarine planktonic cycles in an unpolluted system

The principal objective of the education program will be to offer environmental learning experience to students and instructors at grammar, secondary, undergraduate and graduate levels in a public area having resources that will be protected for this specific use. To assist the development of a sanctuary education program, an Education Subcommittee will be established. The Subcommittee will assist the development of an education program and implementation through coordination with the Sanctuary Advisory Committee and DEP.

A low keyed approach with limited activities is proposed and appropriate within the sensitive vegetative resources of the wetlands. It is proposed that priority use of the sanctuary by educators, and student groups be reserved for those interested in resources found in lower salinity estuarine communities. More specifically, educational use should be particularly concentrated in brackish wetlands communities, tidal freshwater wetlands communities, nontidal freshwater bog and forested wetlands communities, and the wetlands/lowland forest fringe ecotones.

The rationale for limiting uses to these specific habitat rests on the trampling effects quickly apparent on marsh surfaces where pedestrian traffic occurs. Foot paths compact underlying unconsolidated soils, frequently forming standing water depressions while killing standing stems.

However, this does not preclude the development of environmental learning, "hands on" etc. educational programs which will involve the natural resources of the sanctuary.

Development of lower estuarine ecology education programs which could include the development of raised wooden walkways over the marsh surface, guided tours etc. are possible schemes to also enhance the sanctuary's educational opportunities.

## B. Alternatives Considered

### 1. Site Selection

New Jersey has approximately 260,000 acres of tidal marshes, including coastal saline, brackish, and freshwater tidal marshes, and in addition, 395,000 acres of estuarine waters within the State. This is a total of 655,000 acres of estuarine habitat throughout the State.

Unfortunately, many estuaries and their watersheds (drainage basins) have been adversely affected by human activities such as: wetlands filling and dredging for international maritime ports, waterfront housing, and marinas; bottom sediments contaminated from heavy metals and pesticides; deforestation of watersheds for urban, suburban, and agricultural land uses. The Federal Estuarine Sanctuary Guidelines (1974) states, "...areas selected as sanctuaries will be relatively undisturbed by human activities at the time of acquisition. Therefore, most of the areas selected will be areas with a minimum of development, industry, or habitation." (Section 921.3(5)(d)) Figures 3 and 4 depict distribution of developed lands and municipal population densities in New Jersey.

There are a number of alternative estuarine areas in New Jersey which meet this criterion. NOAA/OCZM and DEP have concluded that the Mullica River estuary is the most desirable choice for National Estuarine Sanctuary designation, because it has the following characteristics:

1. Extensive upland watershed protection in the form of public open space land holdings in three state forests (Wharton, Bass River, Green Banks) and multi-layered state regulatory programs in private lands.

2. Watershed constitutes the heart of the New Jersey Pinelands, an ecosystem recognized by the State and Federal governments as an environmental treasure.

3. Comparatively pristine nature of upland watershed.

4. Comparatively pristine nature of wetlands, with the singular exception of one very large but concentrated lagoon residential development.

5. Occurrence of nationally or state listed endangered wildlife species and plants proposed for official listings.

6. High productivity of the system supporting a rich diversity and high population of fish, shellfish, and wildlife.

7. Extensive adjacent wetlands protection in the form of national wildlife refuge (Brigantine) and three state fish and wildlife management areas (Great Bay, Swan Bay, Port Republic).

Futhermore, the Federal Guidelines also states, "The area chosen as an estuarine sanctuary shall to the extent possible, include water and land masses constituting a natural ecological unit." The Mullica River drainage basin (569 square miles) is entirely within one state and is of moderate size and clearly represents the heart of the New Jersey Pinelands ecosystem (ecological unit).

# DEVELOPED LANDS 1972

Figure 3

STATE OF NEW JERSEY

# N.J. MUNICIPAL POPULATION DENSITIES 1976

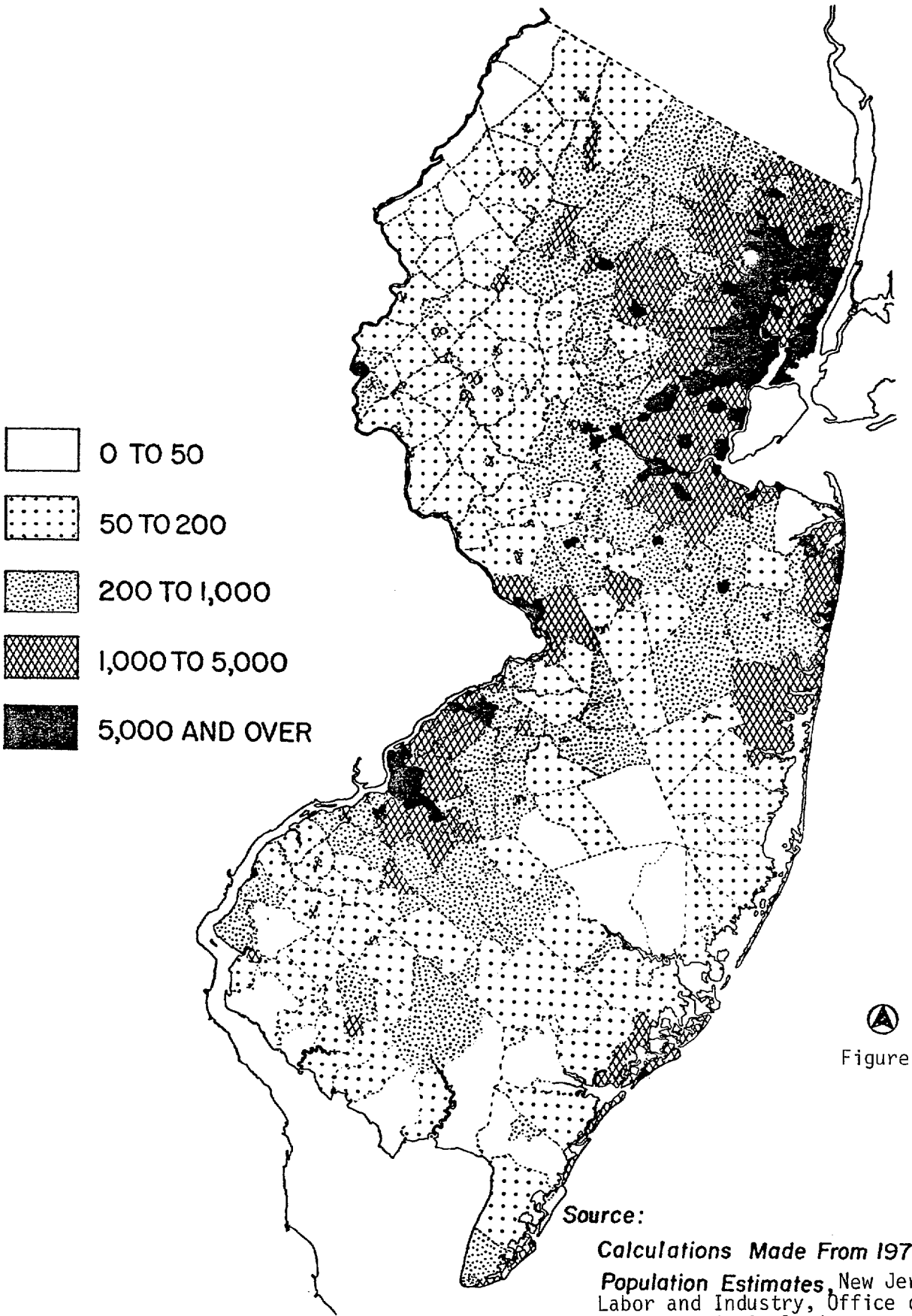


Figure 4

*Source:*

***Calculations Made From 1976 Provisional Population Estimates,*** New Jersey Dept. of Labor and Industry, Office of Demography and Economic Analysis.

In 1978 Governor Brendan Byrne of New Jersey declared the New Jersey Pinelands an irreplaceable environmental resource and by Executive Order 71 implemented a building moratorium. This was followed by enactment of the New Jersey Pinelands Protection Law (NJSA 13.28A-1 et seq. as amended). The adopted New Jersey Pinelands Comprehensive Master Plan, November 1980, speaks repeatedly of the many biological, ecological, and physical environmental treasures of the New Jersey ecosystem, with the Mullica River its very heart.

The 1978 Rutgers University study A Plan for a Pinelands National Preserve states, "the Pinelands of New Jersey represents a truly unique and relatively undeveloped land resource within the most populous section of the U.S." The authors also note that the low degree of development contributes to the high water quality. The study identified the following Habitat Specific and Ecologically Critical Areas in the proposed sanctuary site:

- Wading River, upstream to the vicinity of Chips Folly campground, which contains the only tidal population of southern wild rice in New Jersey (perhaps in all of northeastern North America).
- The west bank of the Mullica River in and around Weekstown, which supports an excellent swamp forest vegetation.
- Hog Island in the upper Mullica River, which represents a unique transitional zone between salt water and freshwater tidal marsh vegetation.

A 1976 independent study by a Rutgers University student* used the 11 Federal criteria for estuarine sanctuaries to rank 12 distinct New Jersey estuarine systems meeting the broad "relatively undisturbed" criterion. The study concluded that the Mullica River estuary is the most suitable area in the state for national estuarine sanctuary designation. The finding was based upon comparative rankings of each potential site.

Name and location of all estuarine areas analyzed:

| Estuarine Areas | Location |
|---|---|
| Mullica River/Great Bay | - Burlington, Atlantic and Ocean Counties |
| Backs/Cedar Creeks | - Cumberland County |
| Nantuxent Creek | - Cumberland County |
| Hope Creek | - Salem County |
| Mad Horse/Stowe Creeks | - Salem and Cumberland Counties |
| Dennis/West Creeks | - Cape May and Cumberland Counties |
| Maurice River | - Cumberland County |
| Diving Creek | - Cumberland County |
| Orandaken/Fishing Creeks | - Cumberland County |
| Cohansey River and Cove | - Cumberland County |
| Great Egg Harbor/Tuckahoe River | - Cape May and Atlantic Counties |

* Thomas P. Smith, Ph.D., Rutgers University, New Brunswick, New Jersey

Smith lists the following advantages of the Mullica River system:

1 a. comparatively little alteration

b. upland watershed protected and wetlands protection in substantial public open space lands

2 a. excellent water quality

b. suitable for potential estuarine sanctuary designation

3 a. highest vegetative diversity of all areas studied

b. transitional habitats present

4 a. greatest migratory waterfowl populations in the state

b. occurrence of endangered species

c. numerous colonial nesting waterbirds

5. abundant fin and shellfish resources

6. adjacent to existing research laboratories

7. previously researched

8. previous public investments in lands

9. due to little development, designation would not conflict with (low) existing uses

10. little socioeconomic impact predicted

State and National programs which have previously identified all or portions of this drainage basin as environmentally or ecologically valuable include the following:

1. The New Jersey Coastal Management Program has designated the portion of the watershed as a Limited Growth Area.

2. National Parks and Recreation Act of 1978 identified the New Jersey Pine Barrens as being environmentally and ecologically of national significance and authorized federal funding of master planning for New Jersey Pinelands Conservation and public acquisition of additional lands.

3. The Smithsonian Institute of Washington, D.C. Center for Natural Areas, Survey of Natural Areas of the Atlantic Coastal Plain (1974) (prepared for the U.S. Department of the Interior, National Park Service) listed 11 specific sites and areas within the Mullica River drainage basin as potential national "Natural Landmarks." They are:

| Area/Site/Name | Priority Rating (1 = highest, 4 = lowest) |
|---|---|
| Great Bay | 2 |
| North Brigantine Island | 3 |
| The Pine Barrens | 1 |
| Atlantic Goose Pond Bogs | 1 |
| Batsto Natural Area and Forge Pond | 4 |
| Hampton Furnace | 4 |
| Martha Furnace | 2 |
| Quaker Bridge | 2 |
| Pine Plains (Dwarf or Pigmy Forests) | 1 |
| Wading River | 1 |
| Brigantine National Wildlife Refuge | 1 |

4. New Jersey Green Acres and Recreation Program has (a) designated four areas as Natural Areas under the State National Areas System Act of 1976, and (b) proposed for designation the Lower Atsion branch of the Mullica River as a Wild and Scenic River under the State statute.

5. The New Jersey Realty Improvement Sewerage and Facilities Act of 1978 designated the entire Mullica watershed as a Critical Area, due to the vast pure groundwater resources within the Cohansey Aquifer.

2. Boundaries

Boundaries and Proposed Acquisition Areas, as defined by the Estuarine Sanctuary Guidelines, "may include any part or all of an estuary, adjoining transitional areas, and adjacent upland, constituting to the extent feasible a natural unit."

Two areas, Swan Bay and the Wading River, are proposed for acquisition in Phase I and the remaining two areas, Mullica River and Bass River, in Phase II of the acquisition process. These are listed in order of priority below.

Under optimum conditions, the entire Mullica River drainage basin (watershed) would be acquired as the natural unit under the National Estuarine Sanctuary Program. (Due to the cost of acquisition this approach is not feasible). The Mullica River drainage basin, though, can be managed as a natural unit, and it is ecologically representative of the

unique New Jersey Pinelands. It can also realistically be purchased and maintained using available Federal and State matching funds.

Of the three major intrastate river systems with over 500 square miles of drainage basin, the Mullica has the most (120,000 acres, or 33 percent of the total land area) land already protected within public ownership. This provides significant upstream protection from potentially damaging future land developments, and therefore identifies it as a desirable area for a National Estuarine Sanctuary.

The following criteria were used in the selection of sanctuary boundaries for the Mullica River system:

1) Research area should include as much diversity as possible in habitat type (flora and fauna communities) which interact with the estuarine zone. The inclusion of many habitat types allows for research and education activities totally within the sanctuary without the necessity to travel elsewhere, or obtain permission of landowners to conduct research and educational activities on their land. Also, diversity provides for contact with all representative trophic levels within the integrated estuarine ecosystem.

2) Research area should be a contiguous area of virtually undisturbed lands and waters, and boundaries should be contiguous to existing State forests and fish and wildlife management areas where possible for administrative (cooperative management) and enforcement purposes.

3) Research area should include an upland forested buffer adjacent to wetlands. Edge habitat, or "ecotone", frequently has greater species diversity and use by wildlife. There is also an important protective function realized by including a forested buffer adjacent to sensitive wetlands. Forested buffers widths from wetlands should be at least 500 feet.

4) Research area should include as much surface and groundwater drainage sources, and/or source type areas as economically feasible. These type areas include non-estuarine types such as freshwater marshes, bogs, and swamp type forest, e.g., Atlantic white-cedar, pitch pine lowlands, and mixed hardwoods. Water sources of the estuarine zone should be represented in order to afford protection of a representatively complete natural aquatic ecosystem.

5) Area should be accessible by land and water.

6) Home sites, farmlands (cranberry production bogs), and other developed (improved) lands should be excluded from acquisition area.

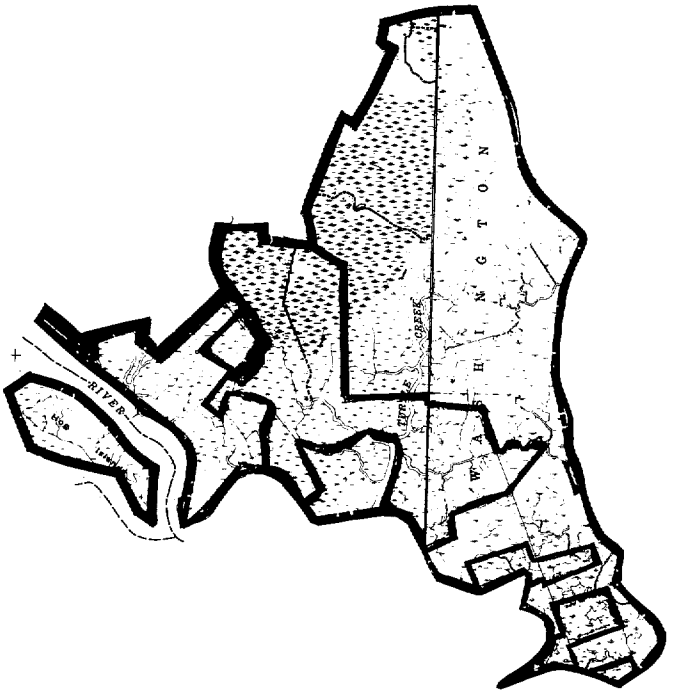


Figure 5
Phase I Acquisition

Swan Bay Area

Mapped, edited, and published by the Geological Survey
Revised in cooperation with New York Department of Transportation

Control by USGS, USC&GS, USCE, New Jersey Geodetic Survey, and City of New York Board of Estimate and Apportionment

Planimetry by photogrammetric methods and from USC&GS Charts T 5111, T 5277, T 5332, T 5490, T 5493, T 5454, T 5460, T 5461, T 5466, T 5468, T 5469, and T 5470
Topography by photogrammetric methods from aerial photographs taken 1954 and planetable surveys 1955
Revised from aerial photographs taken 1966. Field checked 1967

Selected hydrographic data compiled from USC&GS Charts 285, 287, 541, and 745 (1966). This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum. 10,000-foot grids based on New Jersey coordinate system, and New York coordinate system, Long Island zone
1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue

Red tint indicates areas in which only landmark buildings are shown

UTM GRID AND 1967 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4.4 FEET IN UPPER BAY AND 4.8 FEET IN NEWARK BAY

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

NEW JERSEY
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty — Light duty —
Unimproved dirt - - - - - -
Interstate Route U. S. Route State Route

Mullica River - Great Bay Estuarine Sanctuary Proposal

KEY

- COASTAL ZONE BOUNDARY
- PINELANDS PRESERVATION AREA
- PROPOSED ACQUISITION AREAS UNDER ESTUARINE SANCTUARY PROGRAM
- SWAN BAY - HOG ISLAND ACQUISTION

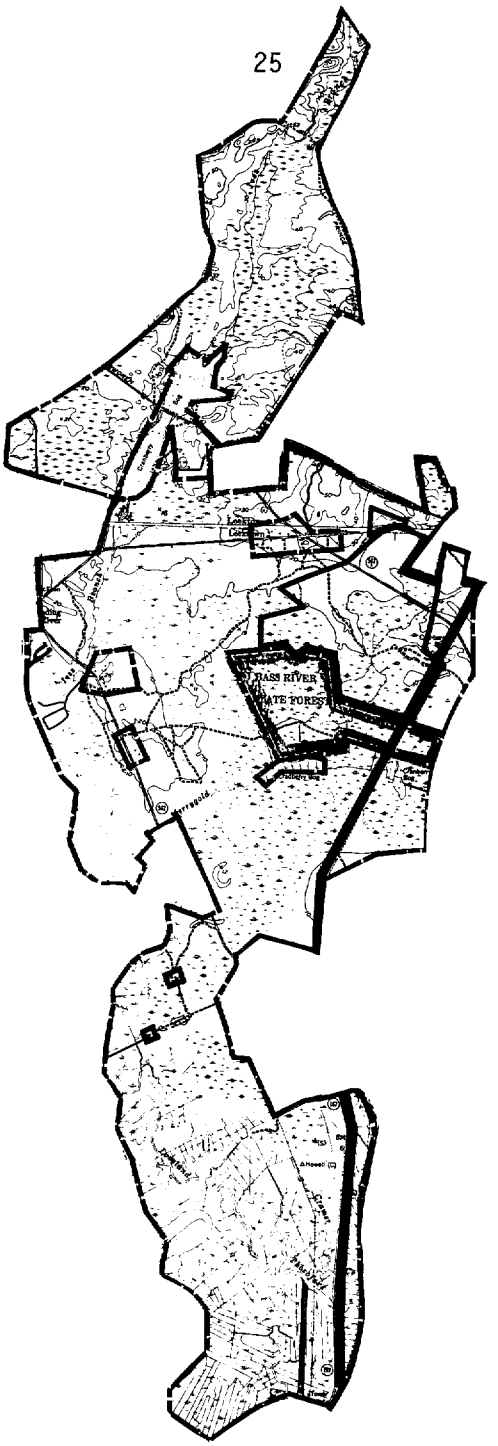


Figure 6
Phase I Acquisition
Wading River Area

Mapped, edited, and published by the Geological Survey
Revised in cooperation with New York Department of Transportation
Control by USGS, USC&GS, USCE, New Jersey Geodetic Survey, and City of New York Board of Estimate and Apportionment
Planimetry by photogrammetric methods and from USC&GS Charts T 5111, T 5277, T 5332, T 5450, T 5453, T 5454, T 5460, T 5461, T 5466, T 5468, T 5469, and T 5470
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Polyconic projection. 1927 North American datum. 10,000-foot grids based on New Jersey coordinate system, and New York coordinate system, Long Island zone. 1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue
Red tint indicates areas in which only landmark buildings are shown

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4.6 FEET IN UPPER BAY AND 4.8 FEET IN NEWARK BAY

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ROAD CLASSIFICATION
Heavy duty — Light duty —
Unimproved dirt . . . .
Interstate Route U.S. Route State Route

Mullica River - Great Bay Estuarine Sanctuary Proposal

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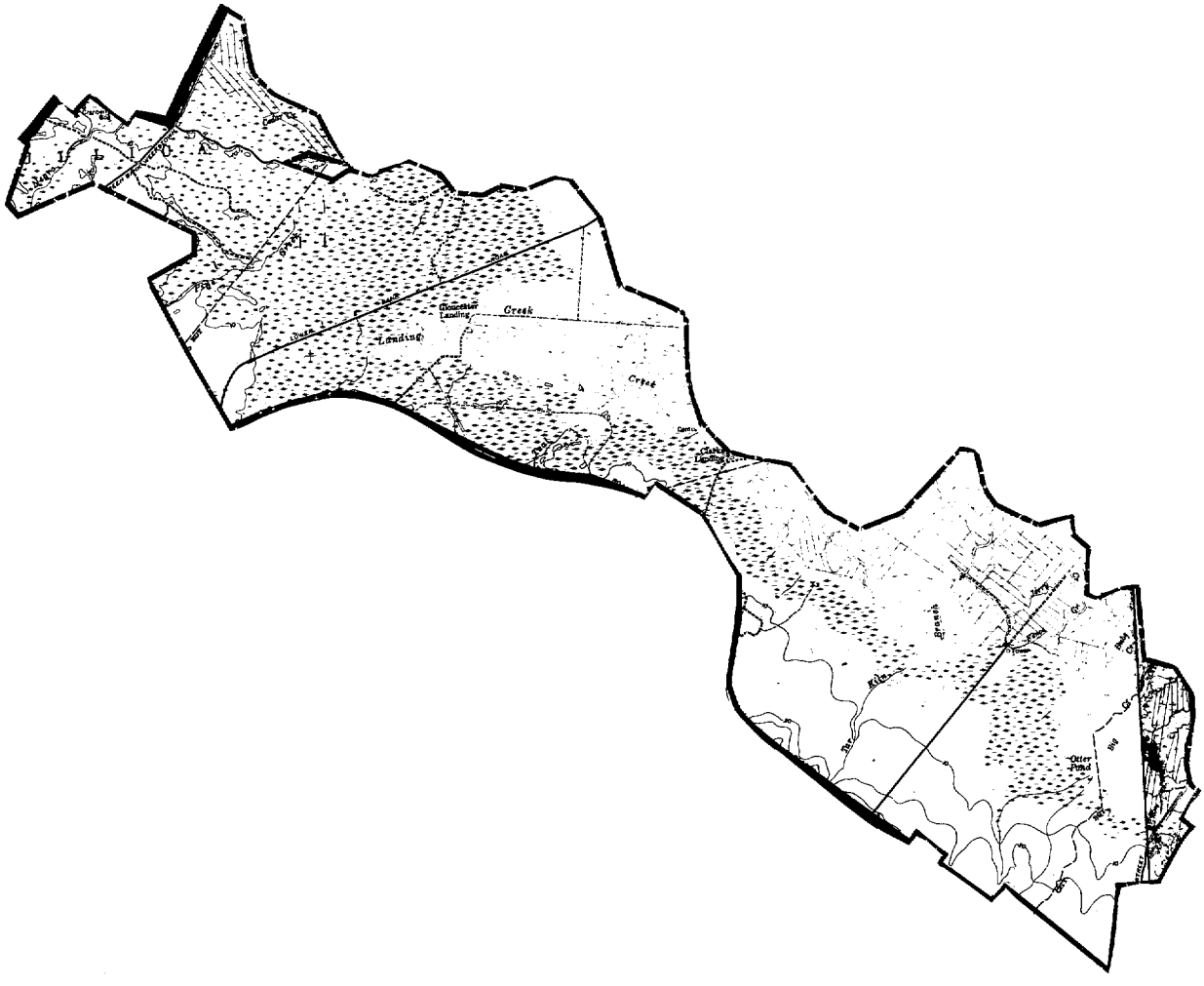


Figure 7
Phase II Acquisition
Mullica River Area

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Planimetry by photogrammetric methods and from USC&GS Charts T 5111, T 5277, T 5332, T 5450, T 5453, T 5454, T 5460, T 5461, T 5466, T 5468, T 5469, and T 5470
Topography by photogrammetric methods from aerial photographs taken 1954 and planetable surveys 1955
Revised from aerial photographs taken 1966. Field checked 1967

Selected hydrographic data compiled from USC&GS Charts 285, 287, 541, and 745 (1966). This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum. 10,000-foot grids based on New Jersey coordinate system, and New York coordinate system, Long Island zone 1000 meter Universal Transverse Mercator grid ticks, zone 18, shown in blue

Red tint indicates areas in which only landmark buildings are shown

UTM GRID AND 1967 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4.4 FEET IN UPPER BAY AND 4.5 FEET IN NEWARK BAY

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
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QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy duty — Light duty —
Unimproved dirt . . . . .
Interstate Route — U. S. Route — State Route

Mullica River - Great Bay Estuarine Sanctuary Proposal

KEY

- COASTAL ZONE BOUNDARY
- PINELANDS PRESERVATION AREA
- PROPOSED ACQUISITION AREAS UNDER ESTUARINE SANCTUARY PROGRAM
- SWAN BAY - HOG ISLAND ACQUISTION

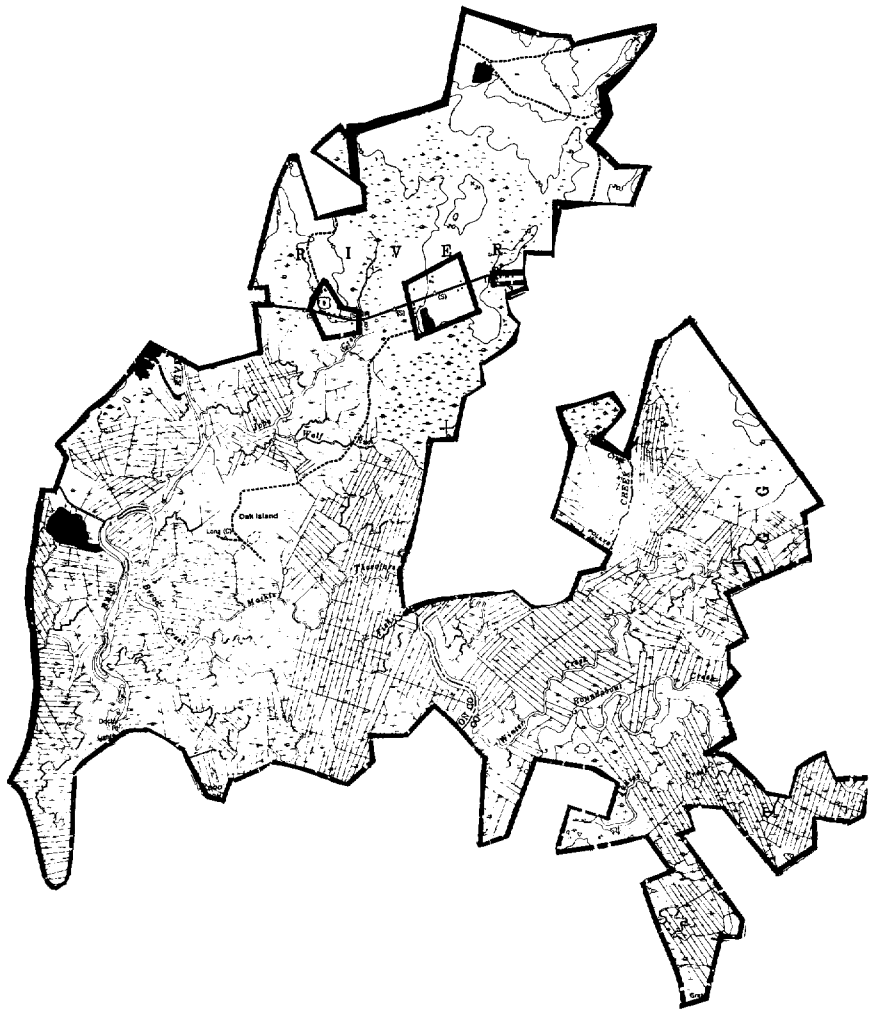


Figure 8
Phase II Acquisition
Bass River Area

Mapped, edited, and published by the Geological Survey
Revised in cooperation with New York Department of Transportation

Control by USGS, USC&GS, ACSCE, New Jersey Geodetic Survey, and City of New York Board of Estimate and Apportionment

Planimetry by photogrammetric methods and from USC&GS Charts T 5111, T 5277, T 5332, T 5450, T 5453, T 5454, T 5460, T 5461, T 5466, T 5468, T 5469, and T 5470

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Red tint indicates areas in which only landmark buildings are shown

UTM GRID AND 1967 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4.6 FEET IN LOWER BAY AND 4.8 FEET IN NEWARK BAY

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ROAD CLASSIFICATION
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Interstate Route — U. S. Route — State Route

QUADRANGLE LOCATION

Mullica River - Great Bay Estuarine Sanctuary Proposal

KEY

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- PINELANDS PRESERVATION AREA
- PROPOSED ACQUISITION AREAS UNDER ESTUARINE SANCTUARY PROGRAM
- SWAN BAY - HOG ISLAND ACQUISITION

3. Acquisition and Funding

a. Acquisition

An alternative to the fee simple purchase of lands for the sanctuary is purchase in less than fee simple. Estuarine Sanctuary Program objectives may be achieved by obtaining "conservation," "restriction," or "development rights" easements, including provisions for research access, educational access, and public recreational access. The New Jersey Conservation Restriction and Historic Preservation Restriction Act of 1980 empowers the New Jersey Department of Environmental Protection to purchase an interest in lands less than fee simple absolute, in order to retain "land or water areas predominantly in their natural, scenic, or open wooded condition, or for conservation of soil or wildlife, or for outdoor recreation or park use, or as a suitable habitat for fish or wildlife... ". Less than fee simple acquisition, such as easements, are preferred if they are cost effective and provide appropriate protection of the resource.

Easements are a one-time purchase; with no subsequent annual payments. If the property were sold, the easement would encumber the land, unless the grantee (purchaser of the easement) unilaterally chose to sell the easement back to the property owner. Purchase of conservation easements would relieve the State of 100 percent of the municipal tax burden, but the State will still be required to pay taxes, on the 13 year declining scale required for those rights purchased.

A property appraisal, title search, and property survey would be necessary for either an easement or fee simple purchase prior to closing.

A sample easement document appears in Appendix 6.

Preferred Acquisition Areas - In Priority Order:

1) Swan Bay and Hog Island - Shown in Figure 5 is the proposed boundary of the Swan Bay and Hog Island Phase I Acquisition Area. The acquisition of 2,065 acres is intended to join the existing 1,078 acres of Swan Bay State Fish and Wildlife Management Area into one contiguous land holding. The acquisition procedure requires using U.S. Department of Interior, Land and Water Conservation Funding in support of New Jersey Pinelands Acquisition and has federal Grant approval (34-00329). A full list of forest and wetlands communities are listed in Table 1.

| Municipality | Number of Lots | Ownership of Record | | | |
|---|---|---|---|---|---|
| | | Individuals | Corporate | Municipal | Sporting Clubs |
| Washington Township | 51 | 33* | - | - | - |

*Multiple-lot ownership

2) Wading River Area - Shown in Figure 6 is the proposed boundary of the Phase I Acquisition Area. The proposed area is 4,819 acres, including 367 acres called Merrygold Estates; 3,705 acres are forested lands and 1,114 acres are coastal wetlands. These totals exclude the two active, farmed cranberry bogs of 88 acres, and other outlined private dwellings in holdings. Within this site fifteen wetlands communities and five pine barrens type forests are represented. The full list of forest and wetlands communities are listed in Table 1.

The municipal tax maps and ownership records of Bass River Township were reviewed in order to obtain the approximate number of lots and individual, corporate, municipal, or sporting club owners of record within the proposed acquisition boundary (see below). The entire proposed acquisition area is within Bass River Township.

| Municipality | Number of lots | Ownership of Record | | | |
|---|---|---|---|---|---|
| | | Individuals | Corporate | Municipal | Sporting Clubs |
| Bass River Twp. | 214 | 167 | 33 | 10 | 4 |

3) Mullica River Area - Figure 7 shows the proposed boundary of the Mullica River Phase II Acquisition Area. The proposed area is 5,392 acres in total. Of this approximately 3,821 acres are forested and 1,571 acres are coastal wetlands.

Within this site eighteen coastal wetlands species communities, with many mixed species stands, are found, and the five characteristic Pinelands forest types are also represented. The full list of forest and wetlands species for the site are listed in Table 1.

The municipal tax maps and ownership records of Galloway and Mullica Townships and the Cities of Egg Harbor and Port Republic were reviewed in order to obtain the approximate number of lots in individual, corporate, municipal, or sporting club ownership of record within the proposed acquisition boundary:

Vegetative Diversity of Estuarine Sanctuary Acquisition Areas

| | East Side Wading River | West Side (Swan Bay) | So. Shoreline Mullica River | East Side Bass River |
|---|---|---|---|---|
| Forest types | | | | |
| Pine/Oak | M | - | VS | M |
| Oak/Pine | VS | - | S | VS |
| Hardwood | L | - | L | M |
| White Cedar | S | - | L | VS |
| Pitch Pine lowlands | L | L | M | - |
| Wetlands Communities | | | | |
| A - *Spartina alternifora* (high vigor) (Salt marsh cord grass) | X | S | VS | L |
| B - *Spartina alterniflora* (low vigor) (Salt marsh cord grass) | S | S | VS | X |
| C - *Spartina patens* (Salt meadow grass) | L | X | M | X |
| D - *Distichlis spicata* (Spike grass) | S | L | S | X |
| E - *Iva frutescens* (Hightide bush) | - | - | VS | M |
| F - *Juncus gerardi* (Black grass) | - | - | VS | VS |
| Fresh/Brackish Wetlands | | | | |
| 1 *Typha angustifolia* (Cattail) | S | X | X | VS |

TABLE 1

| | | | | | |
|---|---|---|---|---|---|
| 2 | Zizania aquatica (Wild rice) | VS | VS | VS | - |
| 3 | Nuphar advena (Yellow water lily) | - | - | - | - |
| 4 | Peltandra virginica (Arrow arum) | S | S | M | - |
| 5 | Phragmites communis (Common reed) | S | L | M | VS |
| 6 | Leersia oryzoides (Cut grass) | - | - | - | - |
| 7 | Pontedaria cordata (Pickerel weed) | VS | VS | VS | - |
| 8 | Polygonum punctatum (Water smartweed) | - | S | - | - |
| 9 | Hibiscus palustris (Marsh mallow) | VS | VS | VS | - |
| 10 | Bare ground | - | - | - | - |
| 11 | Echinochloa walteri (Water miller) | - | - | - | - |
| 12 | Spartina cynosuroides (Salt reed grass) | M | X | X | S |
| 13 | Scirpus americanus (American three square) | S | VS | VS | - |
| 14 | Panicum virgatum (Switch grass) | VS | S | - | - |
| 15 | Scirpus olneyi (Olney's bulrush) | L | X | X | L |
| 16 | Bidens laevis (Bur marigold) | - | - | - | - |

| | | | | | |
|---|---|---|---|---|---|
| 17 | Carex spp. (Sedge) | - | S | VS | - |
| 18 | Acorus calamus (Sweetflag) | VS | VS | VS | - |
| 19 | Impatiens biflora (Jewelweed, Touch-me-not) | - | - | - | - |
| 20 | Polygonum arifolium (Tearthumb) | - | - | - | - |
| 21 | Eleocharis spp (Spike-rush) | - | VS | - | - |
| 22 | Juncus spp. (Rush) | - | S | - | - |
| 23 | Rosa spp. (Rose) | - | - | VS | - |

VS = Very small

S = Small

L = Large

X = Extensive

M = Moderate

The listing of species and wetland types comes from N.J. Department of Environmental Protection Wetlands Maps (1971). Wetlands species occurrence were estimated from totals derived by counting the number of times each specie appeared listed within the alternative acquisition sites. From these totals a scale (based on area size comparisions visually estimated) was devised in order to rank the vegetative diversity within, and in relation to, each of the acquisition areas.

Forest type occurrences were estimated in a similar manner with the size classification being a comparison of forest sizes, between each proposed acquisition area, in relation to each of the other acquisition areas. The information on forest types is based on McCormick and Jones (1973). The Pine Barrens Vegetation Geography and New Jersey Pinelands Commission Vegetation Maps (1980).

| Municipality | No. of lots | Individuals | Corporate | Municipal | Sporting Clubs |
|---|---|---|---|---|---|
| City of Port | 21 | 17 | 4 | - | - |
| Galloway Twp. | 207 | 148 | 33 | 26 | - |
| City of Egg Harbor | 1700 | * | * | * | * |
| Mullica Twp. | 28 | 27 | 1 | - | - |

* There are 1,700 separate tax items (lots) listed for lands of City of Egg Harbor within the proposed Acquisition Area. Due to the large number these were not categorized by ownership.

Also, the City of Egg Harbor has assigned tax sale certificates for many properties within the municipality to the State of New Jersey, at no cost, due to nonpayment of property taxes by owners. This was done on a large scale, and covers virtually all properties within the proposed acquisition area. The State of New Jersey presently has a partial interest in those properties.

4) Bass River Area - Shown in Figure 8 is the proposed boundary of the 5,472 acre Phase II Acquisition Area. Approximately 1,782 acres are forested uplands and 3,690 acres are coastal wetlands. Within this area are found ten coastal wetlands species communities, with many mixed-species associations, and four forest types characteristic of New Jersey Pinelands. The full list of forest and wetlands species for the area is in Table 1.

The municipal tax maps and ownership records of Bass River and Little Egg Harbor Townships were reviewed in order to obtain the approximate number of lots in individual, corporate, municipal, or sporting club ownership of record within the proposed acquisition boundary:

| Municipality | No. of lots | Individual | Corporate | Municipal | Sporting Clubs |
|---|---|---|---|---|---|
| Bass River Twp. | 194 | 161 | 27 | 6 | - |
| Little Egg Harbor Twp. | 11 | 2 | 8 | 1 | - |

Estimated costs for fee simple acquisition of the four areas proposed:

| Area | Size/Acres | Estimated Cost | Acquisition |
|---|---|---|---|
| Swan Bay | 2,065 | $ 490,000 | Phase I |
| Wading River | 4,819 | 1,808,879 | Phase I |
| Mullica River | 5,392 | 2,327,020 | Phase II |
| Bass River | 5,472 | 1,082,948 | Phase II |
| Totals | 17,748 | $5,708,847 | |

b. Funding Resources

The following alternative acquisition funding sources have been considered. At the present time, none of these sources could provide the necessary funding for acquisition of the proposed sanctuary areas except in the Swan Bay area as noted below.

- The National Parks and Recreation Act of 1978 authorized $23 million for acquisition of critical lands within the New Jersey Pinelands National Ecological Reserve. Of that total, $11.2 million has been appropriated and $8.9 allocated by the U.S. Department of the Interior for acquisitions. $8.9 million has been obligated to other acquisition projects. This funding program is on a 75 percent Federal and 25 percent State matching basis and is not limited to estuarine lands.

- The National Land and Water Conservation Act of 1965 (P.L. 88-578) is currently being utilized in the purchase of the Swan Bay Area. The 50 percent Federal matching funds have been authorized, but not yet awarded; however, no other funds are scheduled in the near term as an alternate acquisition funding source for the proposed estuarine sanctuary.

- The Pittman-Robertson Act (P.L. 75-415) provides dedicated Federal funds derived through excise tax on hunting equipment sales and based on the number of hunting licenses purchased in each state. This 50 percent Federal wildlife lands acquisition program has been used in the purchase of the State Great Bay Fish and Wildlife Management Area. The present New Jersey allocation is obligated and is not of sufficient magnitude to implement the proposed estuarine sanctuary program.

- The Dingell-Johnson Act (P.L. 81-681) provides dedicated Federal funding derived from excise tax on fishing tackle and is based on the sale of fishing licenses. This funding program is used for the acquisition of habitats important to fishery resources, and has been used in the purchase of the Great Bay Fish and Wildlife Management Area. This is an ongoing program which could be used to assist in the purchase of estuarine lands, but the present limited New Jersey allocation is obligated to fishery management programs.

- The National Endangered Species Act (P.L. 93-205) has been used in New Jersey for the purchase of the Highbee Beach-Pond Creek area in Cape May County. At present, no Federal funding is scheduled for areas within the proposed sanctuary boundaries.

- A non-public agency alternative acquisition funding source would be the direct purchasing of lands followed by donation, by environmental organizations, charitable organizations, or the property owners. If these lands were donated to the State, they could serve as part of the necessary 50 percent State matching share. Although interest has been expressed by some environmental conservation organizations, no purchase actions to date have solidified.

4. Alternative Management Plans

A management alternative considered, but rejected, was for the State to acquire the proposed estuarine sanctuary area through National Estuarine Sanctuary Program funding and then separate out forested areas and wetlands for administration under existing State programs without the appointment of a Sanctuary Advisory Committee or Sanctuary manager. Forest lands would be added to existing State forests managed by DEP's Division of Parks, Forestry and Green Acres under the provisions of N.J.S.A 13:8-20 et seq., acquisition of forested areas. Wetlands would be managed as a State Fish and Wildlife Management Area by DEP's Division of Fish, Game and Wildlife under authority of N.J.S.A. 23:1-1 et seq., which identifies administration of State Fish and Wildlife Management Areas.

This proposed management structure would offer protection to the affected areas similar to that intended by the National Estuarine Sanctuary Program; however, the Congressional intent for research and education in estuarine sanctuaries would not be explicit. Baseline measurement of the estuarine ecology by scientists and students over a period of time is not a specific goal of this management option. In addition, this option does not provide for a Sanctuary Advisory Committee and the resulting public involvement, would not include provisions for a Sanctuary Manager, and in general does not recognize the estuarine sanctuary as an estuarine system to be used for research and education purposes--a requirement of the National Estuarine Sanctuaries Program regulations.

5. No Action Alternative

Under this alternative, lands adjacent to the Mullica River would not be acquired as an estuarine sanctaury. This alternative would leave the future of the Mullica River Area to be determined by private land owners, municipal planning programs and zoning ordinances, DEP and the New Jersey Pinelands Commission acting within existing legislation.

DEP administers the following laws which will directly affect land use in the proposed sanctuary area:

The Wetlands Act of 1970 (N.J.S.A. 13:9A et seq.)
Coastal Area Facility Review Act (CAFRA) of 1973 (N.J.S.A. 13:19-1 et seq.)
Waterfront Development Law of 1914 (N.J.S.A. 12:5-3)

The substantive guidelines for the above laws are articulated in the Coastal Resource and Development Policies (N.J.A.C. 7:7E as amended). Under the laws and the Coastal Policies for these laws, DEP will allow virtually no development in delineated wetlands, and no major development elsewhere in the sanctuary area. Housing developments of 2 units or less, and County Mosquito Commission activities,are not regulated under CAFRA, and timber harvesting and wetland agriculture are not regulated under The Wetlands Act, however, and therefore are not regulated by DEP.

The New Jersey Pinelands Protection Act of 1979 (N.J.S.A. 13:18A-1 et seq.) delineates a Pinelands Protection Area in which the Wading River, Swan Bay and Mullica River lie. The adopted Pinelands Comprehensive Management Plan would generally prohibit development within 300 feet of coastal and freshwater wetlands. The Bass River area is not covered by this act. While Mosquito Commission activities are regulated under this law, timber harvesting is not.

Although, the present State and Federal regulatory structure on wetlands is quite comprehensive and oriented toward ecological conservation. The State regulatory laws could change. Even if the enabling Coastal and Pinelands legislation were never repealed or amended, development upland of the wetlands not regulated by the State could adversely impact the sanctuary area.

Also, State regulatory programs cannot mandate public access to the area for educational, research, and/or recreational purposes since the lands are privately owned. While researchers have noted very good cooperation with current landowners for research uses, certain owners have quite explicitly been opposed to public recreational uses on their properties. Long-term research projects could be stopped by a change in property ownership or attitude of the same owner.

The only fail-safe mechanism to assure the permanent protection of this area, and its use for public research and education program is through direct public ownership and management.

# PART III: ENVIRONMENTAL CONSEQUENCES

## A. ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Approval of this proposal by NOAA/OCZM would enable the State of New Jersey to purchase estuarine lands and wetlands and a sufficient upland buffer area in perpetuity to establish a National Estuarine Sanctuary representative of the Virginian Biogeographic Region. Combined with the other protected lands owned by the State, this proposed designation would have a variety of environmental and economic impacts.

Creation of the estuarine sanctuary will support a long-term learning process for research and education regarding estuarine systems and dynamics, which could be applied to other Virginian type estuaries as well. The sanctuary would permanently protect natural resources and assure public access for long-term public usage.

This will be a positive environmental impact. Such use will have little, if any, detrimental effects upon the environment, and will be of vital importance to the progressive development and implementation of rational coastal zone management to the local, regional and State levels.

Establishment of the sanctuary will also help to assure permanent protection and public access to a very productive, relatively undisturbed estuarine area. Land acquisition will enhance preservation of water quality as well as marshes, wetlands, and a portion of the adjacent uplands.

The proposed sanctuary will permanently prevent irreversible damage to the environment that could cause the loss of wildlife, vegetation, fish, and other marine life.

Sanctuary designation does not preclude all human activities within the sanctuary boundaries, but it would prevent those uses that cause significant degradation of the system, either through incremental or large scale destruction. The scientific research and educational benefits realized through use of the sanctuary will assist in this control and will provide for the enhancement of the economic and environmental resources of this and other State estuaries.

### 1. Local Impacts on Atlantic, Burlington, and Ocean Counties

The proposed sanctuary will be located in a sparsely developed area. The sanctuary will realize the long term non-quantitative benefit by protecting and enhancing a desired objective; retention of the natural environment. Land acquisition for the proposed sanctuary will have several identifiable long-range effects, the net public impact which is assumed to be positive.

There will, however, be a loss of property tax revenues each year due to removal of taxable land from the municipalities' tax rolls. This loss is estimated to be low because of the high percentage of undeveloped lands, and the loss will be partially compensated by revenues which may be attributable partially to the operation of the sanctuary.

In addition, new money will be injected into each county's economy as a result of land purchases from present owners residing in the county where purchases are made. No permanent residents will be displaced by the purchase of sanctuary land. In the long run the overall negative impact of purchasing sanctuary land will be minimal, since a majority of the lands are generally unsuitable for residential development or commercial use.

Municipal Property Tax Loss (Part III A.2.d.) estimates the impact of the proposed action on each municipality.

The net impact of the proposed sanctuary on renewable and non-renewable resources, is expected to be positive and beneficial to county residents and the general public. The economic benefits associated with the enhancement and maintenance of valuable fish, shellfish and wildlife resources are expected to far outweigh the negative impacts resulting from the loss of diversion of water rights, and prohibition on future timber harvesting and sand and gravel extraction within the sanctuary boundary.

The sanctuary will provide a very small, though long term, stimulus to local employment. The existence of the sanctuary is expected to provide continued employment through its management and maintenance personnel requirements. In addition, the local service industry is projected to increase slightly once the sanctuary is established, operating, and publicized locally, regionally, and Statewide.

Activities associated with the sanctuary will have a positive impact on the local economy. The research and education facilities already within the region include DEP's Nacote Creek Research Station, Brigantine National Wildlife Refuge, Rutgers University Marine Field Station, Little Egg Harbor, Stockton State College, and numerous public primary and secondary schools. These will continue to provide educational opportunities and benefits to professionals, students, the interested public, and future generations. Research and educational projects will provide a small but long term stimulus to the local economy. Additional State, Federal, and private sector funding for research activities could be available once this area is permanently set aside for its stated purposes.

2. Regional Impacts on the Mullica River Drainage Basin

The proposed sanctuary will place additional estuarine lands within the public domain, thus protecting downstream coastal marine resources which require these types of lands and waters as critical breeding, nursery feeding, and wintering areas. Protection of primary vegetative productivity areas which are the basis of estuarine and marine food chains will preserve the natural resource base of fin and shell fisheries.

3. State and Federal Impacts

Acquisition and management of the sanctuary will have a relatively minor short-term impact on the Federal government. The State of New Jersey, however, will need to allocate Green Acres funds, which are authorized and available for acquisition of real property for public use purposes. In addition, the State will be responsible for funding the long-term operation of the sanctuary alone when 50 percent Federal operation/management grants expire after the first 5 years. These expenditures are expected to be offset by two nonquantifiable benefits: (1) improved scientific and technical knowledge to be applied toward producing workable management practices concerning the protection and utilization of estuarine resources here and in other estuarine and coastal zone areas throughout the State; and (2) coordination with the Pinelands National Reserve, under Federal Legislation, and New Jersey Pinelands Area, under State legislation, to establish a unique estuarine sanctuary.

4. Natural Environment

a. Fish, Wildlife, and Vegetative Habitat

Fin fish, shellfish, wildlife, and vegetation depend upon a biological system that provides feeding, nesting, and nursery areas for many species, both migratory and resident.

The sanctuary will have a positive impact by preserving the highest quality ecosystems remaining in the New Jersey coastal zone. Potential and negative impacts on the sanctuary natural resources, caused by increased visitor use, will be controlled by careful management.

b. Air Quality

The proposed sanctuary area currently has relatively good air quality. The establishment of an estuarine sanctuary will have a positive impact by excluding development in the proposed sanctuary, although the area proposed for the sanctuary contains little land that could be developed, even under present regulations. There would not be a negative impact from the proposed sanctuary upon air quality standards outside the proposed boundaries.

c. Water Quality

The estuarine sanctuary will have a positive impact upon water quality since pollution will not occur on lands acquired for the proposed sanctuary. The sanctuary will also assist local and State agencies with developing water quality data collecting programs needed for effective decisionmaking.

d. Mineral Reserves/Archaeological Sites

Protection of the area will mean that mineral reserves in the area will not be fully utilized. Currently, however, the known resources of commercial quantity sand and gravel within the proposed sanctuary are not actively mined. Historic Indian "middens" and other historical sites will not be subject to development pressures and will be protected for future study.

e. Agricultural Lands

Establishment of an estuarine sanctuary will not result in the loss of any agricultural lands. Small agricultural lands adjacent to the sanctuary will provide a functional buffer from human activities and disturbances. However, the proposed sanctuary will not impose any land use or water quality requirements upon agricultural uses outside the proposed sanctuary boundaries.

5. Human Environment

a. Residential/Industrial/Commercial

The owners of land within the proposed boundaries will be affected by the acquisition of their property. All acquisition will be performed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646), which guarantees fair negotiations with property owners, including compensation for relocation expenses if residences or businesses are acquired. NOAA and the State are cognizant of the fact that certain property owners may have "roots" and be in accord with the environment of their land. All reasonable attempts will be made by the State to ensure that acquisition is as nondisruptive as possible to the property owner. Wherever possible, easement purchase, lease back program, life estate, etc. will be used to control sanctuary land and water areas for sanctuary purposes.

b. Public Use

Currently, public use of the system consists of fin and shellfishing, photography, boating, biological studies, nature study/birdwatching, clamming, and waterfowl hunting. These uses are compatible with the estuarine sanctuary and, with the exception of hunting, can be expected to increase in the future, thus providing positive public benefits. Hunting is not precluded by estuarine sanctuary designation, though it could be controlled in certain areas, such as those that contain nesting or loafing areas for rare or endangered species, or in ongoing research sites.

The sanctuary would also have a positive impact upon public use activities by providing needed public lands and managed access sites for usage, thereby reducing trespassing on private property.

c. Scientific and Educational Use/Economic Factors

The additional access sites and public lands will also have positive impacts upon the educational and scientific uses of the area. At the present time, the State University and one State marine laboratory use the area for educational and research work. Usage will modestly increase as a result of the publicly owned and managed estuarine sanctuary.

An unquantified economic factor attributable to the area is the value of research and education to the local economy. For example, the additional students who would attend the colleges and universities, should an estuarine sanctuary be designated, will require lodging and general support facilities from regional merchants. If a multiplier effect of 3.0 is estimated (O'Connor and Sharna, 1976) for the value of educational services, the impact is substantial. For example, if 20 additional students attend Rutgers Marine Field Station and spend $5,000/year each, this would mean an additional $300,000 spent within the regional economy.

The same type of analysis would also apply to the operation and management of the estuarine sanctuary. The State has the option of applying for $50,000 per year for a five-year period from OCZM/NOAA, matched by $50,000 each year from the State, to be used for operation and management of the estuarine sanctuary. This yearly management budget of $100,000, through the multiplier effect, can be estimated to provide up to $300,000 in additional income into the local economy.

d. Municipal Property Tax Loss

Establishment of the sanctuary will create a negative impact on municipal property tax base because of State acquisition of lands. An estimated or actual municipal tax impact appears, as noted, for each municipality in this section (See Table 2).

The boundaries of the proposed acquisition areas boundaries appearing in Figures 5, 6, 7, and 8 were planimetered on USGS 7.5' Topographic Quandrangle Sheets, at a scale of 1:24,000, twice, and the average was taken. These means were multiplied by the standard conversion factor of 91.83 to yield acreage. Each municipality land area was divided into wetlands and forested land following USGS colored boundaries. Indentations of tidal creeks, intramarsh "potholes," mosquito ditches, and other intramarsh surface water features were not planimetered.

It has been the experience of DEP that the saline coastal wetlands contain approximately 20 percent salt marsh cordgrass Spartina alterniflora (Type A) tall form (or high vigor) which is generally a characteristic indication of twice daily tidal flooding. Lands now or formerly flowed by the mean high tide are tidelands (riparian) and are owned by the State of New Jersey and held in the public trust. Therefore, all planimeter acreages of all wetlands types were multiplied by a factor of .20 and that fraction subtracted from the total planimetered wetlands acreage measurement. This was done to provide a reasonable estimate of privately owned wetlands in the absence of adopted claims maps delineating the extent of State-owned tidelands. NJ DEP is in the process of delineating the State-owned riparian lands.

TABLE 2

MUNICIPAL TAX LOSS

| | Swan Bay | Wading River | Mullica River | | | | Bass River | |
|---|---|---|---|---|---|---|---|---|
| | Washington Township | Bass River Township | City of Port Republic | Galloway Township | City of Egg Harbor | Mullica Township | Bass River Township | Little Egg Harbor Twp. |
| Acres of Proposed Acquisition Area | 2,065 | 4,819 | | 3,821 Total | | | 5,472 Total | |
| Total Municipal Land Area in Acres | 68,480 | 50,560 | 5,210 | 59,072 | 7,168 | 34,560 | 50,560 | 31,065 |
| Acres of Proposed Acquisition Area Within Municipality | 2,065 | 4,819 | 389 | 2,266 | 1,924 | 813 | 3,671 | 1,801 |
| %-age of Proposed Acquisition Area to Total Municipal Area | 3.2% | 9.5% | 7.5% | 3.8% | 26.8% | 2.4% | 7.3% | 5.8% |
| Area Includes: | | | | | | | | |
| Wetlands (AC) | 1,900 | 1,114 | 185 | 841 | 545 | --- | 2,095 | 1,595 |
| Assessed Value | * | $55,655 | * | $90,920 | $270,363 | --- | $104,622 | $55,391 |
| Forested Lands (AC) | 165 | 3,705 | 204 | 1,425 | 1,379 | 813 | 1,576 | 206 |
| Assessed Value | * | $1,651,022 | * | $868,053 | $840,031 | * | $702,297 | $110,232 |
| Total Assessed Value of Lands in Proposed Acquisition Areas | $252,807 | $1,706,677 | $59,600 | $958,973 | $1,110,395 | $92,600 | $806,963 | $165,624 |
| 1980 Municipal Tax Rate per $1,000 Assessed Value | $35.90 | $32.00 | $43.30 | $31.70 | $29.30 | $37.70 | $32.00 | $41.00 |
| Potential Property Tax Loss to Municipality | $7,042 | $54,612 | $2,555 | $30,399 | $32,534 | $3,491 | $25,822 | $6,790 |

* Due to limited number of lots within the proposed boundaries, Total Assessed Value of lands within the proposed acquisition area in the municipality was not calculated. Rather, listed assessed values appearing in the Real Estate Atlas of Atlantic County, Thirteenth Edition (1980) by Real Estate Data, Inc. were totaled directly. Since improved lands are located outside the proposed sanctuary boundaries, all improved lands listed were omitted from this total.

e. Mitigation of Municipal Property Tax Losses

The New Jersey Green Acres and Recreation Opportunities Bond Act of 1974 (N.J.S.A. 13:8A-1 et seq.) provides the State of New Jersey shall pay annually to each municipality property taxes for a period of 13 years following such acquisition on a declining scale as listed below:

| Year | Percentage of Taxes Paid By State |
|---|---|
| 1 | 100 |
| 2 | 92 |
| 3 | 84 |
| 4 | 76 |
| 5 | 68 |
| 6 | 60 |
| 7 | 52 |
| 8 | 44 |
| 9 | 36 |
| 10 | 28 |
| 11 | 20 |
| 12 | 12 |
| 13 | 4 |
| 14 | 0 |

In conclusion, the proposed action will result in the loss of local property tax income to the affected municipality(ies), however, this effect will not be immediate, due to the above referenced act which will provide a thirteen-year period for adjustment to this loss of revenues.

## B. UNAVOIDABLE ADVERSE ENVIRONMENTAL OR SOCIOECONOMIC EFFECTS

There are no unavoidable adverse environmental effects from the proposed sanctuary designation.

Unavoidable socioeconomic effects would include the potential loss to municipalities of tax revenues (up to $61,656 under Phase I and an additional maximum loss of $101,346 under Phase II) through public acquisition and lost opportunities for agricultural, residential, or commercial development.

## C. RELATIONSHIP BETWEEN LOCAL SHORT TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG TERM PRODUCTIVITY

While designation of the proposed estuarine sanctuary will restrict local short term uses of the environment, it will also provide long term assurance that natural resources and benefits of the area will be available for future use and enjoyment. Without this additional control, the conflicts between estuarine users could be expected to increase in intensity if implementation or enforcement of current State Coastal Management and Pineland Management laws, programs, and policies are inadequately funded or monitored to accomplish proper environmental conservation.

Establishment of this proposed sanctuary would also preserve habitat for those species officially classified by the Department of the Interior and the National Oceanic and Atmospheric Administration as endangered, i.e., Bald Eagle (Halia Betus Leucocephalus), Peregrine Falcon (Falco Peregrinus). For complete lists of State-designated endangered species, refer to Appendix 4.

Establishment of an estuarine sanctuary at this location will provide additional protection and coordination with adjacent wildlife refuges, State forests, municipal protected lands, and the public open space of Brigantine National Wildlife Refuge, Penn State Forest, Wharton State Forest, Bass River State Forest, and Absecon, Great Bay, Port Republic, and Swan Bay Fish and Wildlife Management Areas.

The proposed estuarine sanctuary and the other public lands would be an assurance of permanent conservation and preservation of the estuary and could enhance values and benefits associated with the open space.

Research information derived from the estuarine sanctuary over the long term will provide a basis for public education and use of estuarine resources; knowledge which can be applied to establishing and managing sanctuary areas other than the Mullica River estuary.

A positive economic impact of sanctuary designation is the potential for coordinated long-term systematic research activities. Potentially beneficial or desirable economic impacts include the long term economic impact of preserving aesthetic and scientific values of the Mullica River drainage basin and Federal matching funds for management of the estuarine sanctuary.

In addition, the local research and education facilities including DEP's Nacote Creek Research Station, Brigantine National Wildlife Refuge, Rutgers University Marine Field Station, Stockton State College, Center for Environmental Studies and Atlantic County College would be encouraged to apply for various field research grants or public education grants, which could increase research and educational use of the area.

The proposed sanctuary will increase the public control of this natural estuarine system, thus directly contributing to the long term maintenance of this environment and its economic benefits. In addition, the estuary will serve as a refuge for part of the living resources of the Virginian province requiring this type of habitat for survival. (See Part IV, Affected Environment.)

Furthermore, since a significant portion of economic activities in these counties is a direct product of the estuarine environment (e.g., fishing and shellfishing, recreational and commercial, boating, sailing, marinas and boat sales and services, and waterfront housing services) the sanctuary will help ensure the maintenance and enhancement of long term economic benefits, as well as ecological productivity.

It is important to point out that some of the potentially negative impacts are mutually exclusive. For example, mineral extraction and commercial clamming could not occur at the same time, for one use would preclude the other as effectively as sanctuary designation would. For this reason, the negative impacts are not additive. In contrast, the positive impacts are compatible and not mutually exclusive, and would all accrue if the sanctuary were designated.

## D. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Sanctuary designation is intended to irreversibly commit estuarine resources in the sanctuary to the purposes of preservation and scientific study. The biological resources would be available for alternative use by such activities as commercial fishing, shellfishing, or silvaculture if these do not interfere with sanctuary goals. Similarly, development of other non-biological resources which would interfere with sanctuary goals, such as the mining of mineral deposits, would be prohibited and any such resources can be considered irreversibly committed.

## E. POSSIBLE CONFLICTS BETWEEN THE PROPOSED ACTION AND THE OBJECTIVES OF FEDERAL REGULATIONS, STATE AND LOCAL LAND USE PLANS, POLICIES, AND CONTROL FOR THE AREA CONCERNED.

There are a number of State and Federal Environmental management programs which incorporate a portion of the Mullica River drainage basin's privately owned lands. All of the regulations and/or policies identified herein are consistent with the proposed establishment and committed use of the Mullica River Sanctuary.

The Coastal Area Facility Review Act (CAFRA), the Wetlands Act and the Waterfront Development Permit Law are the main regulatory tools for implementation of the now Federally-approved New Jersey Coastal Management Program (NJCMP, August 1980) which fully articulates State policies for coastal permit decisions.

The NJCMP has established a series of Rules on Coastal Resource and Development Policies (N.J.A.C. 7:7E-1.1) which describe performance standards to which proposed developments must comply. Location Use and Resource Policies have been adopted and are used within the coastal permit decisionmaking process. The NJCMP, DEP has designated the northwestern portion of the coastal area within Bass River Township (Mullica River's northern shoreline) as a Limited Growth Area where "...the concern is conservation of the natural environment. The spread of development must, therefore, be highly restricted."

In addition, crude oil pipelines are prohibited within the central Pine Barrens region defined as a "critical area" for sewerage purposes under N.J.A.C. 7:9-10.1(b). Natural gas pipelines are also discouraged in the area.

1. State Programs and Enabling Legislation

a. New Jersey Wetlands Act of 1970 (N.J.S.A. 13:9A-1 and N.J.A.C. 7:7A-1.1 et seq.)

This law established a regulatory program for uses of coastal wetlands, defined as "low land subject to tidal action. . . upon which may grow or is capable of growing some" of the 19 named salt, brackish and freshwater wetlands plant species. The law is administered by DEP's Division of Coastal Resources.

This law resulted in a drastic reduction in the previous rate of wetlands destruction. Production of 914 wetlands maps delineating State regulated wetlands and regulated uses include: draining; dredging; excavation of soil, mud, sand and gravel; dumping; erection of structures; and similar activities. Activities not covered include commercial production of salt hay or other agricultural crops, and activities conducted by the counties' Mosquito Control Commissions and the Tidelands Resource Council (a State decision-making body for riparian grants, leases and licenses).

Tidal wetlands were formerly being destroyed at an average rate of 1,500 acres per year. Since implementation of this law, an average of only 55 acres have been lost each year, and only for clearly water-dependent uses. In 1979 and 1980 development was permitted on less than one acre of regulated wetlands.

b. Coastal Area Facility Review Act of 1973 (CAFRA) (N.J.S.A. 13:19-1, N.J.A.C. 7:7D-2.0 and 2.6(a)(4))

This law established a State planning and regulatory program for major facilities within a specifically defined coastal area. Facilities are defined as housing developments of 25 units or greater, most industrial operations, utilities, public infrastructure, etc. No regulated facility can be constructed in the coastal area prior to receipt of a CAFRA permit, with mandatory EIS submission, DEP review, and public hearing.

c. Waterfront Development Law (N.J.S.A. 12:5-3, NJAC 7:7.2.1 et seq.)

The Waterfront Development Law authorizes DEP to regulate the construction or alteration of docks, wharves, piers, bulkheads, bridges, pipelines, cables or other "similar or dissimilar development" on or adjacent to navigable waterways and streams throughout the State. In the coastal area defined by CAFRA which includes the area in and near the proposed sanctuary, the law applies to development proposed only in water areas.

d. Tidelands Management

In New Jersey, "tide-flowed" or riparian lands are owned by the State of New Jersey, except where already conveyed. These are lands now or formerly flowed by the mean high tide, including filled lands. The State owns the

lands as trustee for the public, and must administer their use in the public interest. The State exercises control over the tidelands in two ways; through its proprietary role as owner, and through its regulatory role under the Waterfront Development Law.

The State's ownership interest extends to the mean high water mark, which is determined on the basis of a theoretical 18.6 year tide.

The State's ownership role is exercised through the Tidelands Resource Council, which may grant, lease, or license the use of State-owned tidelands provided such action is in the public interest. Persons seeking to purchase, lease or otherwise use these lands must first obtain the Council's approval. A great deal of the State's tidelands were sold (granted) in the nineteenth and early twentieth centuries, but it is the present practice of the Council to only issue licenses for use of the land, and not to convey them outright.

The Council, which is composed of twelve citizens appointed by the Governor with the advice and consent of the New Jersey State Senate, has broad discretion concerning applications for tidelands conveyances. The Council may make any decision it believes to be in the public interest.

In keeping with traditional riparian law, the owners of land immediately upland have the first right to purchase or use tidelands. But before any person may make use of tidelands, the Council requires that they obtain a Waterfront Development Permit. Since the permit may only be granted if the activity is consistent with the Coastal Resource and Development Policies this requirement ensures that the use of tidelands will conform with those policies.

e. New Jersey Pinelands Protection Act of 1979 (NJPPA)(P.L. 1979, CH. III; N.J.S.A. 13:8A-1 et seq.)

The Pinelands Protection Act established a framework for the comprehensive planning and regulation of development in the approximately 1,000,000 acres of fragile, highly valued pinelands that reach across central and southern New Jersey.

The proposed estuarine sanctuary is located within this area. The Act is intended to accomplish the purposes of the National Parks and Recreation Act of 1978 (P.L. 95-625), which authorized Federal support for Pinelands protection through planning and land acquisition. The Federal Act directs the Department of the Interior to provide up to $3 million in planning assistance if requested by the Governor, and up to $26 million in implementation funds following submission of an acceptable master plan. This plan was approved by the U.S. Secretary of Interior in January 1981. Both the planning process and a moratorium on State permit approvals and financial assistance were initiated by a Governor's Executive Order (No. 71) in March, 1979. The Pinelands Protection Act was subsequently passed and signed into law on June 28, 1979.

The Act establishes the following policy goals for the Pinelands:

1. For the entire pinelands area, to protect, preserve and enhance the significant values of the resources thereof in a manner which is consistent with the purposes and provisions of this act and the Federal Act.

2. For the protection area:

(a) Preserve and maintain the essential character of the existing pinelands environment, including the plant and animal species indigenous thereto and the habitat therefore;

(b) Protect and maintain the quality of surface and ground waters;

(c) Promote the continuation and expansion of agricultural and horticultural uses;

(d) Discourage piecemeal and scattered development; and

(e) Encourage appropriate patterns of compatible residential, commercial and industrial development, in or adjacent to areas already utilized for such purposes, in order to accommodate regional growth influences in an orderly way while protecting the pinelands environment from the individual and cumulative adverse impacts thereof.

3. For the preservation area to:

(a) Preserve an extensive and contiguous area of land in its natural state, thereby insuring the continuation of a pinelands environment which contains the unique and significant ecological and other resources representative of the pinelands area;

(b) Promote compatible agricultural, horticultural and recreation uses, including hunting, fishing and trapping, within the framework of maintaining a pinelands environment;

(c) Prohibit any construction or development which is incompatible with the preservation of this unique area;

(d) Provide a sufficient amount of undeveloped land to accommodate specific wilderness management practices, such as selective buring, which are necessary to maintain the special ecology of the preservation area; and

(e) Protect and preserve the quantity and quality of existing surface and ground waters.

The Act created a 15-member Pinelands Commission in, but independent of, DEP.

Within one year of the plan's adoption, every county and municipality located in whole or in part in the Protection Area must submit to the Commission a master plan and/or zoning ordinance which complies with the adopted policies. Also following adoption, state regulatory and capital spending decisions in the area must comply with the policies (established).

The Pinelands National Reserve overlaps with the coastal zone in portions of Ocean, Burlington, & Atlantic Counties, and in the Mullica River watershed there is also overlap between the coastal zone and the Pinelands Area under the jurisdiction of the State Pinelands Act. In this latter area, coastal permits and approval from the Pinelands Commission are both required for new development. This area is designated a part of the Preservation Area by the Pinelands Protection Act and a Limited Growth Region by the Coastal Resource and Development Policies, indicating a consistency of the policies. In the area of overlap between the coastal zone and the National Reserve which is not under the jurisdiction of the Pinelands Protection Act, the Coastal Management Program is the principal means of implementing the Pinelands Comprehensive Management Plan.

f. DEP Division of Fish, Game and Wildlife

This Division has previously acquired four Fish and Wildlife Management Areas within the basin's salt marshes, tidal wetlands, and uplands. They are:

| | |
|---|---|
| Great Bay | (3,789 acres) |
| Swan Bay | (1,078 acres)* |
| Port Republic | ( 755 acres) |
| Absecon Wetlands | (1,313 acres) |

*Additional lands in the process of being acquired by DEP as part of the Pinelands Commission's CMP.

The location of these areas and other public lands is depicted in Figure 1.

g. DEP Division of Parks and Forestry

This Division manages the most extensive public lands holdings within the Mullica River drainage basin. These include:

| | |
|---|---|
| Wharton State Forest | (99,671.8 acres) |
| Penn State Forest | ( 3,266.0 acres) |
| Bass River State Forest | ( 9,100.1 acres) |

h. Green Acres and Recreation Program (N.J.S.A. 13:1B-15.12(a) et seq.)

Natural areas designated under the Natural Areas Systems Act of 1976 are State lands defined as "an area of land or water which has retained its natural character, although not necessarily completely undisturbed or having rare or vanishing species of plant and animal life or similar features of interest which are worthy of preservation for the use of present and future residents of the State." Areas designated to date within the Mullica River drainage basin include:

| | |
|---|---|
| Batsto | (350 acres)* |
| Oswego River (Martha's Bog) | (200 acres)* |
| Absegami Trail | (100 acres)* |
| North Brigantine Island Natural Area | (678 acres)† |

*Portions of existing State Forests
†Separate State lands acquisition.

The Green Acres program determines where and how State funds should be spent for open space acquisition, development, and maintenance. DEP's Office of Pinelands Acquisition, coordinates all acquisition under the Pinelands protection programs.

Green Acres also administers the Wild and Scenic Rivers System under the New Jersey Wild and Scenic Rivers Act of 1977 (N.J.S.A. 13:8-45 et seq.). The Lower Atison Branch of the Mullica River has been proposed for inclusion in this system.

The State Heritage Program, administered by Green Acres, has selected the Mullica River drainage basin to conduct a review of cultural resources.

i. DEP Division of Water Resources

This Division has authority for planning and regulating water supplies, quality and treatment, and floodplain use, throughout the State.

The Division administers the New Jersey Realty Improvement Sewerage and Facilities Act (N.J.S.A. 58:11-44 et seq.). The law requires that no building permits be issued within the Mullica River drainage basin, along with other additional Pinelands watersheds, as shown in Figure 6, which have been designated as Critical Areas defined in N.J.A.C. 7:9-10.1(b).

j. Department of Community Affairs

The State Development Guide Plan (Revised Draft of February 1980) has proposed that limited lands outside the New Jersey Pinelands Protection or Preservation Area (classified Conservation Areas) within the Mullica River watershed be "Limited Growth Areas." For these lands, "...it is neither desirable nor feasible to prohibit development... New growth... would require major public investments in services and facilities... Accordingly, Limited Growth Areas should be left to grow at their own moderate pace... areas which do not now appear to be necessary to accommodate projected population increases may become critically important resources for the New Jerseyans of the 21st Century." Conservation areas are "areas of State-wide significance. They are too large or too expensive to be acquired and managed by local or county governments, yet they contain resources and recreational opportunities which should be enjoyed by present and future generations."

# PART IV: AFFECTED ENVIRONMENT

The New Jersey Pinelands Comprehensive Management Plan (New Jersey Pinelands Commission, November 1980) was extensively used in writing the following section, and much of the text is adapted from that source and Kantor 1980.

## A. General Physiography

The proposed sanctuary site is located in the Mullica River estuary, New Jersey's largest and least developed coastal estuarine system. The site includes parts of Atlantic, Burlington and Ocean Counties and is within the Mullica River Drainage Basin, which forms the heart of the million-acre New Jersey Pinelands, the Nation's first National Reserve. The proposed sanctuary site includes nearly pristine tidal marshes and forested uplands. The area supports diverse marine, estuarine, and terrestrial biological communities, including endangered species.

Three factors contribute to the essential character of the Mullica River. First, there are the physical features of the landscape, including relief, soils, and hydrology. Second, there are living organisms, the plants and animals the Mullica area supports. And third, there are ecosystem processes, the dynamic interrelationships among and between the living organisms and their particular habitat elements which have evolved over thousands of years.

Outside influences, both natural and human-caused, may alter these factors. In this section of the EIS, the significant natural and man-made influences that determine the nature of the Mullica River area are identified.

## B. Geology

The processes of deposition, sea level change, erosion and land uplift in the past have had a significant influence on today's Mullica River landscape and ecosystem.

The Mullica River is located in the Atlantic Coastal Plain geologic formation, created over the last 170-200 million years by depositional and erosional processes. The Atlantic Coastal Plain is characterized by gently rolling terrain, with sandy, droughty soils and no rock outcrops, steep slopes, or mountain peaks. In general, it is comprised of a wedge-shaped series of unconsolidated layers of sands, clays and marls on a gently southeastward dipping bedrock (80 to 100 feet per mile) which is 1,300 to 6,000 feet below the surface. These layers extend seaward into the submerged Continental Shelf.

The lowest geological beds originate from continental deposits (Lower Cretaceous Age). These are overlain by deposits of both continental and marine origin (Upper Cretaceous Age) dating from 65-136 million years before present (MYBP). Specific formations within this group are, oldest to youngest, the Hornerstown Sand, Vincentown and Manasquan Formations, Kirkwood Formation, Cohansey Sand, and Beacon Hill Gravel.

Overlying the Tertiary deposits are those which were laid down during the Pleistocene (Wisconsin) glaciation (1.8 MYBP) and the Holocene period (0.01 MYBP). The Cape May Formation deposited during this time extends from sea level to 30 to 50 feet above sea level and is considered to be of marine origin. The Holocene, alluvial and eolian in origin, appear to be a redeposition of the older deposits.

The Kirkwood Formation, the Cohansey Sand and the Quaternary Deposits are the most important geologic formations of the Mullica River drainage basin, and are described below.

Kirkwood Formation

The Kirkwood Formation is overlain by the Cohansey Sand. The irregular surface of the Kirkwood ranges from over 100 feet above sea level in its outcrop area to over 300 feet below sea level along the eastern edge of the Cape May Peninsula. The formation is between 50 and 100 feet thick in its outcrop and thickens to over 800 feet in the Atlantic City area.

The Kirkwood has variable lithology both along its outcrop and downdip. The outcrop consists of a lower component that is a very fine, dark, micaceous sand with a pebbly glauconitic basal layer two to four feet thick, and an upper component of silt and clay.

Under the coast in Cape May County, five distinct members have been recognized in the Kirkwood. These are, oldest to youngest: a tough, brown basal clay; the lower aquifer, a grey, medium-to-coarse sand (Atlantic City 800-foot sand); a blue, silty diatomaceous clay; the upper aquifer, a medium-to-coarse sand (Rio Grande Zone); and a blue diatomaceous clay.

The lithology of the formation along the downdip appears to remain fairly consistent, with the sand component generally varying between 50 and 100 feet.

Cohansey Sand

The 2,350 square mile Cohansey overlies the Kirkwood Formation, southeast of the Kirkwood outcrop. The occurrence of outliers within the Kirkwood outcrop indicates that the Cohansey was more extensive at one time. It either outcrops at the surface or is overlain by a veneer of Pleistocene deposits, thin except in Cape May County and along the eastern coast, where these deposits may have a thickness of 200 feet. The combined thickness of the Cohansey and overlying Pleistocene deposits ranges from less than 20 feet to more than 200 feet.

The Cohansey Sand typically consists of fine to coarse grained quartzose sand with lenses of gravel that are usually one foot thick or less. In most areas, overall clay content is less than 20 percent. Lenses of white, yellow, red and light grey clay occur generally in the upper part of the formation and may be as much as 25 feet thick. The sand is predominantly yellow (limonite staining), but shades of white, red, brown, and grey also occur. Parallel bedding and cross-stratification are present in the sand.

Quaternary Deposits

These deposits form a discontinuous veneer lying above the Cohansey throughout much of the Pinelands. They are, from oldest to youngest, the Bridgeton, Pennsauken and Cape May Formations.

The Bridgeton and Pennsauken deposits are generally derived from erosion and redisposition of the Cohansey Sand and Beacon Hill Gravel. They cap the tops and mantle the upper slopes of most of the pronounced hills and narrow ridges, and can be as much as 20 feet thick.

The Cape May Formation in Cape May County contains four lithologic components deposited in three environments - estuarine, marine and deltaic. Elsewhere, the thickness of this formation is 85 feet near Batsto, 112 feet at Sweetwater, and 229 feet at Atlantic City.

The most important hydrologic function of the Cape May deposits is their ability to absorb precipitation and transmit water to underlying aquifers. Because hydraulic continuity with the underlying Cohansey is excellent, they can be considered a part of the Cohansey Sand - Upper Kirkwood aquifer system, although this has been debated.

The particular characteristics of the Pinelands geology - low relief with sandy, droughty soil, underlain with a number of water-bearing sand layers alternating with confining clay layers - give rise to a unique and fragile surface and groundwater system. In essence, precipitation is rapidly absorbed by the droughty sand, percolates through the soil to the relatively shallow water table, and in turn supports the region's stream flow as groundwater seepage. The following section discusses the hydrogeologic characteristics of the strata underlying the Pinelands, the existing groundwater quality, and sources of degradation.

C. Hydrology

The most important abiotic element of the Pinelands ecosystem is water. Water is stored in the extensive sand aquifers below the surface. This ground water supports 89 percent of the flow in the Pinelands streams, discharging primarily through the swamps and marshes. It is replenished solely by precipitation, 44 percent of which percolates through the sandy soil surface.

Although highly permeable, the uppermost soil tends to be chemically inert with a low adsorbtive capacity. It is therefore incapable of filtering out wastes. In addition, the waters are susceptible to various forms of pollution because they are weakly buffered against chemical change. Groundwater contamination in the Pinelands is a significant threat.

The proposed sanctuary site is within the Mullica River Drainage Basin, which includes seven sub-basins.

Streams in the proposed sanctuary area have a characteristic and typical composition which is as important to the maintenance of the ecosystem as are the water flows and the groundwater levels. The typical, high-quality Pinelands stream is slow-moving, brown but clear, has a sandy substrate, and is overhung by dense vegetation. The water is soft and the pH is low. It generally has a high level of dissolved humic matter, especially in the summer months, and may have fluctuating oxygen levels due to bog and swamp drainage and organic demands. There are low levels of nutrients and suspended and dissolved solids, and such streams can be classified as dystrophic.

Mullica River Drainage Basin

The Bass River sub-basin is relatively undeveloped and contains large State land holdings. The water quality index value of slightly disturbed at the East Branch station is probably conservative. The suspended solids 90th-percentile concentration was only 0.5 mg/l higher than the 12.5 mg/l cutoff point. The slightly elevated solids load could be attributable to activities at the State recreation area immediately upstream from the sampling station. The headwaters of the East Branch, West Branch, and Barlett's Branch of Bass River are not within current public land holdings.

The Wading River sub-basin has minimal developed land. However, it is used extensively for cranberry and blueberry production. Water quality levels on the West Branch of the Wading River and the East Branch (Oswego River) are slightly disturbed. The elevated suspended solids and fecal coliform levels are probably due to localized problems.

It is most important that the water quality of the Wading River and its tributaries be maintained as high as possible. Tributaries in the upper watershed which lie outside of State-owned lands are most critical. These headwater streams include Yellow Dam Branch, Plains Branch, Beaver Branch, Ives Branch, Pole Branch, Probst Branch, Goose Pond, and sections of the West Branch around Chatsworth.

Water quality within the Batsto River sub-basin is good to slightly disturbed. An analysis of the fecal coliform/fecal streptococcus level shows that the bacterial contamination could be caused by human waste and/or livestock and poultry waste. The latter category includes wild game. High total dissolved solids levels in Springers Brook could be due to the surrounding agricultural practices. High pH and alkalinity concentrations indicate the use of lime or septic systems contamination.

The Batsto River increases in quality downstream. Good quality is found at the station at Batsto due to cleansing action as the river passes through bogs and swamps. The headwaters areas of Springers Brook, Indian Mills Brook, and the Batsto River are not currently protected. These areas are particularly vulnerable to development pressure from the Medford Lakes region. The Batsto River is a major tributary of the Mullica River.

Water quality in the Atsion-Mechesactauxin sub-basin is quite variable. The most disturbed water quality on the Wildcat Branch is probably due to the industrial point source, urban development, and surrounding agricultural land. This station provides a good illustration of the fragile character of headwater areas. The normal low flows of the small streams are not adequate to assimilate the waste. Water quality at all other stations is rated either good or slightly disturbed due to elevated suspended solids loads. These loads could be due to natural conditions.

This sub-basin probably has the greatest potential within the Mullica River system for being impacted by development. The small, upper streams which are not within the Wharton tract are very close to the developing centers of Berlin and Atco.

Because there is only one water quality station at the base of the Nescochague Creek sub-basin, it is impossible to evaluate any upstream water quality impact. Water quality at that station in Pleasant Mills is slightly disturbed due to suspended solids concentrations; probably caused by natural conditions.

The Nescochague sub-basin is divided by Route 30 running from Philadelphia through Hammonton. Development pressure is high. Management of the headwater areas is critical to water quality in the Mullica River.

The Hammonton Creek sub-basin has poor to very poor water quality because of point sources, urban runoff, and agricultural practices. Based on the water quality index and pH values, Hammonton Creek has the worst water quality in the whole Pinelands area. The high nutrient loads can adversely impact Nescochague Lake, the Mullica River, and finally Great Bay. The high pH values will alter the acid water-dependent Pinelands aquatic communities. Improvements of water quality would require controls on all sources of contamination.

The Mullica River drains a significant portion of the Pinelands National Reserve. The sub-basin encompassing its lower main stem is affected by drainage from the upper tributaries and by the tidal influence of Great Bay. Due to lack of data, the impact of direct drainage to this section of the Mullica could not be determined.

The Atlantic County portion of the sub-basin is more threatened than the Burlington County portion because it has more land area, more development and more agricultural land. Within the total Mullica River Basin, the Lower Mullica is not as vulnerable as the upper watersheds because its capacity to assimilate pollutants is greater. If the upper reaches are altered by development and agricultural practices, the entire river and estuarine system will feel the impacts.

D. Biological Resources

1. Vegetation

Differences in groundwater levels result in two distinct floristic complexes, the uplands and the lowlands (McCormick, 1979; Robichaud and Buell, 1973). Lowlands are found on sites where water is near or above the surface during some part of the year. The upland complex occurs in the remaining area. The water level of sites occupied by this complex is seldom nearer to the surface than 2 to 3 feet and may be as deep as 60 to 70 feet (McCormick, 1979). This contrast in moisture conditions between the upland and lowland sites is probably intensified by the highly permeable, sandy soils. In the subdued topography of the Atlantic Coastal Plain, however, the boundaries between these complexes are often not sharply defined. Subtle differences in topography result in a rich mosaic of different vegetative types.

Upland Complex Vegetation

The uplands support two major vegetation types or associations, pine-oak forests and oak-pine forests. Fire plays an important role in determining the composition of these upland forests. Differences in resistance to fire damage, shade tolerance, and reproductive strategies are responsible for the selective action of fire on the different plant species.

Following a fire, oaks and pines have the ability to resprout from dormant buds which lie protected beneath the soil surface and from along their trunks. This ability varies among the oaks and pines. Oaks are less resistant to both wounding and killing by fire than pitch or shortleaf pine (Pinus rigida; P. echinata) (Little, 1946; Little and Moore, 1945). Shrub oaks, blackjack and bear oak (Quercus marilandica, Q. ilicifolia), are more fire adapted than the tree oaks such as white and black oak (Q. alba., Q. velutina). They exhibit a greater capacity to sprout and produce acorns on much younger sprouts following a fire. Pitch pine is more resistant to fire damage and retains its basal sprouting over a long period of time than shortleaf pine.

Fire also results in the removal of the thick mat of litter covering the forest floor. This provides a more suitable seedbed for pines which, unlike oaks, require mineral soil or a thin layer of litter and minimal shading for the establishment of seedlings. The overall effect of fire favors pine over oak. In the absence of fire or other severe disturbances such as land clearing, pitch pine and shortleaf pine would be replaced by oaks and other hardwoods. If this occurred, the character and composition of the forest would be substantially modified.

Pitch pine is the dominant tree of the upland pine-oak forest of the Pinelands. This species is commonly associated with blackjack oak, black oak, chestnut oak (Quercus prinus), white oak scarlet oak (Q. coccinea), and post oak (Q. stellata), as well as southern red oak (Q. falcata) in the southern portion of the Pinelands. A large part of the regionis covered with pine-blackjack oak, a vegetation type which characterizes the selective action of frequent, severe fire (McCormick, 1979). Pine-post oak and pine-black oak associations also occur in the region but are scattered and may be limited in size. Common understory include the shrub-form scrub oak, lowbush blueberry (Vaccinium vacillam) and black huckleberry (Gaylussacia bacata).

Lowland Complex Vegetation

Lowland forests include: Atlantic white cedar swamps, pitch pine lowlands, bogs, and inland and coastal marshes. The lowland forests in the region are composed manly of Atlantic white cedar (Chamaecyparis thyoides), trident red maple (Acer rubrum), black gum (Nyssa sylvatica), and pitch pine, Gray birch (Betula populifolia), sassafras (Sassafras albidum), and sweetbay magnolia (Magnolia virginland) are often present. Other lowland associations, primarily in the regions periphery, may contain sweet gum (Liquidambar styraciflua), pin oak (Quercus palustris), willow oak (Q. phellos), basket oak (Q. michauxii), and water oak (Q. nigra). Both natural and manmade bogs are found throughout the region. Many abandoned bogs have been colonized by grasses (Gramineae) and sedges (Carex spp.) forming inland marshes. Similar freshwater marshes are also found along Pinelands streams. Extensive tidal marshes are found along the coastal Pinelands borders.

The cedar swamps are characterized by dense, even-aged stands of narrow-crowned Atlantic white cedar. While cedar predominates in the canopy, pitch pine is often present as well. Trident red maple, blackgum, and sweetbay are also common in the understory. Dangleberry (Gaylussacia frandosa), highbush blueberry (Vaccinium corymbosum), swamp azalea (Rhododendron viscosum), fetterbush (Leucothoe racemosa), sweet pepperbush (Clethra alnifolia), and bayberry (Myrica pennsylvania) are likely to occur in the shrub layer. Hardwoods and shrubs are far more numerous and can form a dense layer at the edges of stands or under stands that have been partially cut or are declining. While herbaceous growth is rarely very dense, there is a wide variety of species present in areas where there are conopy openings. These commonly include pitcher plant (Sarracenia purpurea), sundew (Drosera spp.), and chain fern (Woodwardia virginica). A rich carpet of mosses (Sphagnum spp). covers the ground. Ceder swamps are found in narrow bands running along many of the smaller stream courses and in larger configurations in the broader valleys.

Fires rarely begin or spread in the wet and poorly drained cedar swamps. Unless a fire is driven by a strong wind, or drought conditions exist, these lowlands usually act as fire breaks. Atlantic white cedars are extremely susceptible to fire injury because of their thin bark and flammable foliage, and they do not sprout after stems are killed by fire. Subsequent reproduction depends on the depth to which the organic soil has been burned, the nature of the previous stand, and the extent of browsing by deer. While the combined effect of fire and cutting has

frequently reduced the area in white cedar and favored hardwoods, proper use of both favors cedar (Little, 1950).

The canopy of hardwood swamps is predominantly trident red maple, commonly associated with blackgum and sweetbay. Sassafras and grey birch also occur frequently.

The pitch pine lowland forest is characterized by a dense canopy composed of pitch pine. The understory is often dense, supporting maple and blackgum as well as a variety of lowland shrubs.

Three types of bogs are found in the area; active cranberry bogs, open bogs, and shrub thickets.

Coastal marshes, dominated by salt marsh cordgrass and salt hay, are often adjacent to to bands of hardwood swamp. Rushes, spike grass, and glassworts are often associated with the dominant spartinas.

2. Wildlife

The high productivity of this region extends beyond the terrestrial boundaries to the estuarine and marsh environments. The organic nutrients produced within the tidal freshwater and salt marshes and carried by tidal flushing of the estuaries are essential to the coastal marine food chain. The trophic levels of estuarine productivity are illustrated by the variety of estuarine and marine fishes, shellfish and other wildlife which thrive there. High species diversity usually reflects environmental health. Sixty one different species of fin fishes have been recorded in the estuary. Major anadromous fish include striped bass, alewife, and blueback herring which spawn in the basin's tributaries. Eleven spawning runs have been confirmed. Shellfish resources are extensive, and support a small commercial oyster fishery as well as recreational and commercial clamming.

The Great Bay region is a major migratory stop and wintering area for many migratory waterfowl and shorebirds as well as a major raptor (owls, hawks and falcons) wintering area. During the winter season, the area's waterfowl population is over 70,000 individuals. The diversity of vegetative growth permits a wide spectrum of bird species; Brigantine National Wildlife Refuge recorded 251 species of birds in 1971. Exemplary nesting species include the State-designated endangered species of osprey, least tern, and black skimmer. There are at least 44 distinct water bird nesting colonies (rookeries) for 15 different species. These include egrets, ibis, gulls, terns, and skimmers.

The Mullica River estuarine community supports a diverse population of organisms, ranging from algae through invertebrates to fish and mammals, and their respective predators. Species lists are available in the Appendices.

3. Endangered Species

Plants

Numerous plant species in the Mullica River area area listed as threatened or endangered by the U.S. Department of the Interior. Eight Pinelands plant species are currently being evaluated for such listing. Also, a study completed for the New Jersey Pinelands Commission inventoried 71 rare plant species, including ferns, grasses, sedges, and broad-leaved plants, and assigned each a status of endangered, threatened, or undetermined. Table 3 gives the status of rare Pinelands plants.

Mammals

No mammal species found in the Mullica River area are currently listed as endangered or threatened by the U.S. Fish and Wildlife Service. Two species formerly found in the area, the black bear and the bobcat, have been extirpated. The beaver was eliminated through unregulated trapping but has been reintroduced and is now common in the area.

Birds

Two bird species found in the Mullica River area, the bald eagle and the peregrine falcon, are Federally listed endangered species. In addition, a number of bird species are listed on the New Jersey official list of endangered and threatened species. Table 4 gives the status of rare bird species in the area.

Coastal marshes in the area serve as sites for ongoing attempts to reintroduce the peregrine falcon into the New Jersey ecology.

Reptiles and Amphibians

While there are no reptiles or amphibians in the Mullica River area which are Federally listed as endangered or threatened, nine herptile species are so listed by New Jersey. Endangered species are the Pine Barrens treefrog, the timber rattlesnake, the bog turtle, the southern gray treefrog, and the tiger salamander. Threatened species include the northern pine snake, the corn snake, the wood turtle, and the mud salamander.

The Mullica River watershed is a major stronghold for the timber rattlesnake. The population of this species in the area has been sharply reduced by human actions, including collecting, killing, and reduction of habitat by residential development.

TABLE 3 **Threatened and Endangered Plant Species of the New Jersey Pinelands**

| Species | Status | Geographical Affinity | Habitat | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Pine-oak | Oak-pine | Pitch pine lowland | Cedar swamp | Hardwood swamp | Water, bog, or marsh | Non-forested |
| Sensitive-joint-vetch *Aeschynomene virginica* | T | S | | | | | | • | |
| Red milkweed *Asclepias rubra* | T | S | | | | | | • | |
| Silvery aster *Aster concolor* | T | S | • | | | | | | |
| Pickering's morning glory *Breweria pickeringii* | T | S | | | | | | | • |
| Pine Barrens reedgrass *Calamovilfa brevipilis* | F<br>T | S | | | | | | • | |
| Barratt's sedge *Carex barrattii* | T | S | | | | | | • | |
| Sickle-leaved golden aster *Chrysopsis falcata* | T | N | | | | | | | • |
| Spreading pogonia *Cleistes divaricata* | E | S | | | | | | • | |
| Broom crowberry *Corema conradii* | E | N | • | | | | | | |
| Rose-colored tickseed *Coreopsis rosea* | T | N | | | | | • | • | • |
| Rushfoil *Crotonopsis elliptica* | E | N/S | | | | | | | • |
| Stiff tick trefoil *Desmodium strictum* | T | S | • | • | | | | | |
| Knotted spike rush *Eleocharis equisetoides* | E | N/S | | | | | | • | |
| Resinous boneset *Eupatorium resinosum* | T | S | | | | | • | • | |
| Pine Barrens gentian *Gentiana autumnalis* | E | S | • | • | • | | | | • |
| Yellow-fringed orchid *Habenaria ciliaris* | E | N/S | | | | • | • | • | |
| Crested yellow orchid *Habenaria cristata* | E | S | | | | | | • | |
| Southern yellow orchid *Habenaria integra* | F<br>E | S | | | | | | • | |
| New Jersey rush *Juncus caesariensis* | F<br>T | S | | | | • | • | • | |
| Lily-leaved twayblade *Liparis liliifolia* | E | N/S | | | | | | | • |
| Loesel's twayblade *Liparis loeselii* | E | N/S | • | • | • | • | • | | |
| Southern twayblade *Listera australis* | T | N/S | | | | • | • | • | |
| Boykin's lobelia *Lobelia boykinii* | E | S | | | | | | • | |
| Canby's lobelia *Lobelia canbyi* | T | S | | | | | | • | |
| Hairy ludwigia *Ludwigia hirtella* | T | S | | | | | | • | |
| Linear-leaved ludwigia *Ludwigia linearis* | E | S | | | | | • | • | |
| Climbing fern *Lygodium palmatum* | E | N/S | | | | | • | | |

Note: Swamp pink (*Helonias bullata*) has been added to the Commission's list. Status — T: geographic affinity — S: habitat —cedar and hardwood swamps.

TABLE 3 **Threatened and Endangered Plant Species of the New Jersey Pinelands, *Continued***

| Species | *Status | Geographical †Affinity | Habitat | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Pine-oak | Oak-pine | Pitch pine lowland | Cedar swamp | Hardwood swamp | Water, bog, or marsh | Non-forested |
| Torrey's muhly *Muhlenbergia torreyana* | F T | S | | | • | | • | • | |
| Yellow asphodel *Narthecium americanum* | T | S | | | | | | • | |
| Floating heart *Nymphoides cordata* | T | N/S | | | | | | • | |
| Narrow panic grass *Panicum hemitomon* | T | S | | | | • | • | • | |
| Hirst's panic grass *Panicum hirstii* | F E | S | | | | | | • | |
| American mistletoe *Phoradendron flavescens* | T | S | | | | | • | | |
| Maryland milkwort *Polygala mariana* | T | S | | | | | | • | • |
| Slender rattlesnake root *Prenanthes autumnalis* | E | S | • | | | | | • | • |
| Awned meadow beauty *Rhexia aristosa* | E | S | | | | | | • | |
| Capitate beakrush *Rhynchospora cephalantha* | T | S | | | • | | • | • | |
| Slender beaked rush *Rhynchospora inundata* | T | S | | | | | • | • | |
| Knieskern's beaked rush *Rhynchospora knieskernii* | F T | S – | | | | | | • | |
| Curly grass fern *Schizaea pusilla* | F | N | | | | • | | | |
| Chaffseed *Schwalbea americana* | E | S | | | | | | | • |
| Long's bulrush *Scirpus longii* | F | N | | | | | | • | |
| Slender nut rush *Scleria minor* | T | S | | | | | • | | • |
| Reticulated nut rush *Scleria reticularis* | T | N/S | | | | | • | • | |
| Sclerolepis *Sclerolepis uniflora* | T | N/S | | | | | • | • | |
| Wand-like golden rod *Solidago stricta* | E | S | | | | | • | | • |
| Little ladies tresses *Spiranthes tuberosa* | T | N/S | • | • | | | | | • |
| False asphodel *Tofieldia racemosa* | E | S | | | | | • | | |
| Humped bladderwort *Utricularia gibba* | T | N/S | | | | | • | • | |
| White-flowered bladderwort *Utricularia olivacea* | E | S | | | | | | • | |
| Purple bladderwort *Utricularia purpurea* | T | N/S | | | | | | • | |
| Reclined bladderwort *Utricularia resupinata* | E | N/S | | | | | | • | |
| Yellow-eyed grass *Xyris flexuosa* | T | S | | | | | • | • | • |

*Status codes: T = Threatened (Caiazza and Fairbrothers, 1980)
E = Endangered, (Caiazza and Fairbrothers, 1980)
F = Currently being evaluated for the federal (national) list of threatend and endangered species by the Department of the Interior.

†N = Northern S = Southern

TABLE 4 —Threatened and Endangered Bird Species of the Pinelands and Their Habitats

| SPECIES | Pine-oak | Oak-pine | Pitch pine lowland | Cedar swamp | Hardwood swamp | Water | Bog | Inland marsh | Coastal marsh | Agricultural | Bay | Urban | Non-forested | Non-pine barrens | Old fields | Barrier beach | Island |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ENDANGERED: | | | | | | | | | | | | | | | | | |
| Bald eagle* *Haliaeetus leucocephalus* | | | | | | • | • | • | | | | | | • | • | • | |
| Peregrine falcon* *Falco peregrinus* | | | | | | | • | • | | | | | | • | | • | |
| Osprey *Pandion haliaetus* | | | | | | • | • | | | | | | | • | • | • | • |
| Cooper's hawk *Accipiter cooperii* | • | • | • | • | • | | • | | | | • | | | | | • | |
| Least tern *Sterna albifrons* | | | | | | | | | | | | | | • | • | • | • |
| Black skimmer *Rhynchops niger* | | | | | | | | | | | | | | • | • | • | • |
| THREATENED: | | | | | | | | | | | | | | | | | |
| Pied-billed grebe *Podilymus podiceps* | | | | | | • | • | • | | | | | | • | • | | |
| Red-shouldered hawk *Buteo lineus* | • | • | • | • | • | | • | | • | | | | | | | | |
| Great blue heron *Ardea herodias* | | | | | • | • | • | • | | | | | | • | • | | |
| Merlin *Falco columbarius* | | | | | | | • | • | | | | | | • | | • | |
| Upland sandpiper *Bartramia longicauda* | | | | | | | | | | • | | | • | | | | |
| Roseate tern *Sterna dougallii* | | | | | | | | | | | | | | • | • | • | • |
| Barred owl *Strix varia* | • | • | • | • | • | | | | • | | | | | | | | |
| Short-eared owl *Asio flammeus* | | | | | | | | • | | | | • | • | • | | • | • |
| Red-headed woodpecker *Melanerpes erythrocephalus* | • | • | • | | • | | | | • | | | | | | | | • |
| Cliff swallow *Petrochelidon pyrrhonota* | | | | | | • | • | • | | • | | | | • | • | • | |
| Short-billed marsh wren *Cistothorus platensis* | | | | | | | • | • | | | | | | • | | | |
| Bobolink *Dolichonyx oryzivorus* | | | | | | | | • | | • | | • | | • | | | |
| Savannah sparrow *Passerculus sandwichensis* | | | | | | | | • | | • | | • | • | • | | • | |
| Ipswich sparrow *Passerculus sandwichensis princeps* | | | | | | | | | | | | | | | | | • |
| Grasshopper sparrow *Ammodramus savannarum* | | | | | | | | | | • | | • | • | • | | • | |
| Henslow's sparrow *Ammodramus henslowii* | | | | | | | • | • | | | | | • | • | | | |
| Vesper sparrow *Poocetus gramineus* | | | | | | | | | | • | | • | • | | | | |
| Northern harrier *Circus cyaneus* | | | | | | | • | • | • | • | | • | • | • | | • | • |

*Listed as endangered by U.S. Department of the Interior.
All others listed as endangered or threatened by New Jersey.

E. Human Activities

The waters and wetlands of the Mullica River area are presently utilized mainly for recreational purposes. Local residential and tourists' expenditures support many seasonal businesses. Recreation activities include boating, fishing, crabbing, waterfowl hunting, sailing, birdwatching, and beach combing. Commercial crabbing, clamming, oystering, fur trapping, marinas, and boat services are also within this area. Notably absent are maritime commerce, petrochemical, and electric generating facilities.

The area has potential for energy related development as a result of the Department of the Interior, Bureau of Land Management Outer Continental Shelf Lease Sales. One hundred and ninety-two leases have been sold at a total cost of $1.88 billion. The leasing area ranges from 56 to 100 nautical miles directly east and southeast of the Mullica River.

To date, three small natural gas and one small crude oil discoveries have been made. If commercial reserves are located, pipelines will be proposed to bring the resources to shore, with a potential landing somewhere along the New Jersey coast. In addition, an offshore floating nuclear generating plant site at the mouth of Great Bay (Little Egg Inlet) was proposed and later abandoned. An OCS service base at Rum Point, Absecon Inlet was proposed in 1977, discouraged by DEP and not pursued further by the would-be developer.

The Rutgers University Marine Field Station, boardwalks, year-round and summer housing, amusement parks and hotel-casinos are additional examples of the diversity of uses in the surrounding region.

Resort-related retail businesses along the coast cater to the tourists' desires while some uses exploit the very resources which draw the visitors and summer residents. Growth of human population often leads to increased public pressure for habitat alterations. Most salt marshes adjoining Great Bay, for example, have so far been spared from destructive lagoon housing and dredge and fill operations so common to the northern estuaries of New Jersey. However, one large lagoon housing development (Mystic Island) is found on the northern shore wetlands. In addition, one small lagoon development exists near Green Bank. Insecticide spraying throughout the State is now regulated by DEP. The drainage ditches constructed during the Great Depression however remain in certain wetlands areas. Mosquito control measures, including ditching, drainage, and pesticide spraying on wetlands, can alter and harm the environment.

The success of the Atlantic City casinos has increased substantially the interest and pressure for residential housing, commercial and retail services, and transportation facilities in Atlantic City and the adjoining mainland municipalities of Atlantic County.

Between the passage of the New Jersey Casino Referendum in November 1977 and April 1981, 52,199 units of residential housing, condominiums, hotels, motels, and camping sites have been proposed for siting in Atlantic County.

Towne of Smithville

In January 1981, DEP issued a CAFRA permit for the first units of the Towne of Smithville in Galloway township, which, as proposed and conceptually approved by DEP in September 1980, will ultimately include 6,850 residential units as part of a planned residential development. These DEP decisions have been appealed by several environmental groups and are now under review. Public concern has also been expressed about the Smithville project in terms of its impact upon the proposed Sanctuary. NOAA/OCZM and New Jersey DEP have determined, however, that since the Smithville project would be built entirely downstream of the proposed sanctuary site, direct impacts will not materialize. In addition, while the Towne of Smithville will substantially increase the population in the area surrounding the Sanctuary, NOAA/OCZM and New Jersey DEP believe that since the sanctuary location is well removed from main roads, it will not suffer detrimental primary or secondary impacts.

The land use plan incorporates 6,850 residential units on 1,124 acres. Planned commercial land uses include the Towne Center and neighborhood residential and commercial uses totaling about 129 acres. In addition, another 90 acres near the Garden State Parkway are planned for office/business uses which could comprise research centers, corporate or regional headquarters, general office and light manufacturing uses.

The Open Space plan sets aside about 955 acres for low intensity uses. These include a site for a school, a 200 acre golf course, an equestrian center, buffers and conservation areas, trails and bike paths, and recreation and sports uses such as playing fields. The sites designated for open space encompass areas determined by the consultants to be environmentally sensitive or, because of their location in relation to other types of land uses, were chosen for recreational sites.

Since the Smithville area is relatively underdeveloped within its regional context, a proposal of this magnitude involves the need to supply either major new or expanded utility infrastructure. The applicant has stated that sewerage from the entire site will be pumped through five local pump stations to the existing main Smithville pump station, and then treated at the Atlantic County Sewerage Authority's City Island Treatment Plant. Potable water will be drawn from five production wells near the center of the site, treated, and stored in two tanks. The wells would tap the Cohansey formation.

There is the potential for a significant increase in runoff resulting from development of this site. The applicant has stated that its main objective is to develop the site with a zero increase in runoff after development. A series of swales and retention and detention basins will collect runoff for percolation to the groundwater and slow dispersal to the stream system.

# PART V: LIST OF PREPARERS

## Mr. Richard A. Kantor - New Jersey Department of Environmental Protection

Mr. Kantor is an Environmental Scientist II for the New Jersey Department of Environmental Protection, Division of Coastal Resources, Bureau of Coastal Planning and Development. He assembled the data incorporated into the Mullica River Estuarine Sanctuary DEIS and is the principal State author of the document.

Mr. Kantor's education includes a B.S. degree in Biology (1969) from Monmoth College in West Long Branch, New Jersey, and a M.S. degree in Marine Biology (1972) from Long Island University in Greenvale, New York. He has a wide variety of experience in biological research, planning, contract management and teaching. In addition, Mr. Kantor lectures, and through analysis, writing and supervision provides resource expertise for developing state coastal regulatory programs. He is the New Jersey DEP liaison to the U.S. Department of the Interior marine program and the New Jersey Marine Sciences Consortium in Sandy Hook, New Jersey.

## Mr. Lawrence N. Bonino - New Jersey Department of Environmental Protection

Mr. Bonino is an intern with the Bureau of Coastal Planning and Development within the New Jersey DEP, Division of Coastal Resources. His responsibilities in the preparation of the DEIS included research and collation of project data and production of graphics for the document.

Mr. Bonino is currently a student at Cook College, Rutgers University. His internship with the New Jersey DEP includes direct involvement in the planning, organization and completion of the Mullica River Estuarine Sanctuary project.

## Mr. Milton H. Martin - Office of Costal Zone Management

Mr. Martin is an environmental planner for the Washington State Department of Ecology, currently on a 1-year leave from the State to work with the NOAA/OCZM Estuarine Sanctuary Program Office. He is Project Manager for the Mullica River Estuarine Sanctuary proposal. Mr. Martin is the principal OCZM author of the DEIS, and was responsible for overall direction, organization, and preparation of the DEIS for publication.

Mr. Martin's background is in the field of Administration and Management in public recreation and parks, where he has held the following positions since 1959: Director, Parks and Recreation Department, Vancouver, Washington; Superintendent, Parks and Recreation Department, Benton County, Washington; Assistant Director, Washington State Parks and Recreation Commission; and Assistant Administrator, Washington State Outdoor Recreation Agency.

He is a lecturer on public parks and recreation administration and has prepared and conducted workshops, conferences, and various public programs relating to recreation financing, programs, management techniques, recreation legislation, etc.

Mr. Martin is the 1980 recipient of the Washington State Environmentalist of the Year Award for Washington State appointed officials.

Ms. Gloria Thompson - Office of Coastal Zone Management

Ms. Thompson is Program Support Specialist for the Estuarine Sanctuary Program Office. Her major responsibilities in the preparation of this DEIS were editing, incorporation of revisions, and final preparation of the document for publication.

Mr. Richard Kelly - Office of Coastal Zone Management

The Estuarine Sanctuary Program Office wishes to acknowledge the contribution of Mr. Kelly, from the OCZM/NEPA Office, in the preparation of this document.

## Acknowledgements

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David N. Kinsey, Director of DEP's Division of Coastal Resources and John R. Weingart, Chief of that Division's Bureau of Coastal Planning and Development supervised the State's involvement in the Estuarine Sanctuary Program. Clerical support from Ms. Carol Claudili and Ms. Celestine Allen is greatly appreciated.

Additional help was provided by Thomas P. Smith, Ph.D. student at Rutgers University in 1975, Elizabeth Riley and Grace Syseskey, student interns from Rutgers University in 1978 and 1979, Cynthia Lotys, a student intern from Hamilton High School in 1979, and Hardy Pearce, a mid-career fellow, from Princeton University in 1980.

Russell A. Cookingham and Pete McLain, Director and Deputy Director, respectively, of DEP's Division of Fish, Game and Wildlife, and Douglas W. Bridges, Director of DEP's Division of Parks, Forestry and Green Acres, each helped develop this proposal through discussions and reviews of draft material.

John Stokes and Robert A Zampella of the New Jersey Pinelands Commission were also of great assistance.

Special note is made of the invaluable contribution provided by Howard Wolf, Robert Marshall, and Larry Feigenbaum of DEP's Pinelands Acquisition Office.

PART VI: LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS RECEIVING COPIES

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
Department of Commerce
Department of Defense
Department of Energy
Department of Health, Education & Welfare
Department of Housing & Urban Development
Department of the Interior
Department of Justice
Department of Labor
Department of Transportation
  U.S. Coast Guard
Environmental Protection Agency
Federal Energy Regulatory Commission
General Services Administration
Marine Mammal Commission
Nuclear Regulatory Commission

National Interest Groups

American Association of Port Authorities
American Bar Association
American Bureau of Shipping
American Fisheries Society
American Gas Association
American Hotel and Motel Association
American Industrial Development Council
American Institute of Architects
American Institute of Merchant Shipping
American Institute of Planners
American Littoral Society
American Mining Congress
American Oceanic Organization
American Petroleum Institute
American Shore and Beach Preservation Association
American Society of Civil Engineers
American Society of Landscape Architects, Inc.
American Society of Planning Officials
American Water Resources Association
American Waterways Operators
Amoco Production Company
Ashland Oil, Inc.
Association of Oil Pipe Lines
Atlantic Coast Shellfish Council
Atlantic Richfield Company
Atlantic States Marine Fisheries Commission
Barrier Islands Coalition
Boating Industry Association

Center for Law and Social Policy
Center for Natural Areas
Center for Urban Affairs
Center for Urban and Regional Resources
Chamber of Commerce of the United States
Chevron U.S.A., Inc.
Cities Service Company
City Service Oil Company
Coastal States Organization
Conservation Foundation
Continental Oil Company
Council of State Governments
Council of State Planning Agencies
The Cousteau Society
Environmental Policy Center
Environmental Defense Fund, Inc.
Environmental Law Institute
EXXON Company, U.S.A.
Friends of the Earth
Getty Oil Company
Gulf Energy and Minerals, U.S.
Gulf Oil Company
Gulf Refining Company
Gulf South Atlantic Fisheries Development Foundation
Independent Petroleum Association of America
Industrial Union of Marine & Shipbuilding Workers of America
Institute for the Human Environment
Institute for Marine Studies
Interstate Natural Gas Association of America
Izaak Walton League
League of Conservation Voters
League of Women Voters Education Fund
Marathon Oil Company
Marine Technology Society
Mobil Oil Corporation
Mobil Exploration & Producing, Inc.
Murphy Oil Company
National Association of Conservation Districts
National Association of Counties
National Association of Engine & Boat Manufacturers
National Associaton of Realtors
National Association of State Boating Law Administrators
National Association of State Park Directors
National Audubon Society
National Boating Federation
National Coalition for Marine Conservation, Inc.
National Commission on Marine Policy
National Conference of State Legislatures
National Environmental Development Association

Rice University Center for Community Design
and Development
Shell Oil Company
Shellfish Institute of North America
Shipbuilders Council of America
Sierra Club
Skelly Oil Company
Southern California Gas Company
Sport Fishing Institute
Standard Oil Company of Ohio
Sun Company, Inc.
Tenneco Oil Company
Texaco, Inc.
Union Oil Company of California
U.S. Conference of Mayors
Water Pollution Control Federation
Water Transport Association
Western Oil and Gas Association
Wildlife Management Institute
The Wildlife Society
World Dredging Association

Congressional

Honorable William W. Bradley
Honorable James J. Florio
Honorable Edwin B. Forsythe
Honorable William J. Hughes
Honorable Harrison A. Williams, Jr.

State Officials and Agencies

Governor Brendan Byrne
Honorable Daniel J. Dalton
Honorable John Paul Doyle
Honorable Hazel S. Gluck
Honorable William L. Gromley
Honorable Lee B. Laskin
Honorable Joseph A. Maressa
Honorable Michael J. Matthews
Honorable Steven P. Perskie
Honorable Dennis L. Riley
Honorable John R. Rocco
Honorable John F. Russo
Honorable Thomas J. Shusted

Delaware & Raritan Canal Commission
Delaware River Port Authority
Delaware Valley Regional Planning Commission
Department of Agriculture
Department of Community Affairs
Department of Energy

Department of Health
Department of Labor and Industry
Department of the Public Advocate
Department of State
Department of Treasury
Hackensack Meadowlands Development Commission
Mid-Atlantic Regional Fishery Management Council
New Jersey Marine Fisheries Council
Pinelands Commission
Regional Planning Association
South Jersey Resource Conservation and Development Council

Local and Regional Government

Affected Municipalities (Mayors, Planning Boards, and Environmental Commissions) in Atlantic, Burlington, Camden, and Ocean Counties within the Mullica River Drainage Basin.

| | |
|---|---|
| Atlantic County: | Egg Harbor City, Galloway, Hammenten, Mullica, and Port Republic |
| Burlington County: | Bass River, Sharnong, Tabernacle, Washington, and Woodland |
| Camden County: | Berlin, Chesilhurst, Waterford, and Winslow |
| Ocean County: | Lacey, Little Egg Harbor, Stafford, and Union |

Affected Counties (Executives, Freeholder Directors, Planning and Environmental Agencies).

Atlantic County
Burlington County
Camden County
Ocean County

State and Local Interest Groups

Environmental Groups

American Littoral Society
Association of New Jersey Environmental Commissions
Atlantic Audubon Society
Atlantic County Citizens Council on Environment
Citizens Association to Protect the Environment
Coalition of Bergen and Hudson
Concerned Citizens for Clean Water
Conservation Society of Long Beach Island
Cumberland Conservation League
League for Conservation Legislation
Millstone Watershed Association
New Jersey Audubon Society

Individuals

Carol Barrett
Stan Cramer
Karen Doherty
Oliver Edstrom
Larry Ermillio
Wayne Farren
Joe Forsyth
Warren E. Fox
Bob Jones
Tom Lloyd Associates
Peter Plage
Irvin Reigner
Albert Ricciardi
Ron Rulou
Jeff Shear
Tom Smith
Horace Somes, Sr.

# PART VII: APPENDICES

1. Estuarine Sanctuary Guidelines

2. Title 7 - Department of Environmental Protection
   Subtitle B. Division of Parks and Forestry

3. Title 7 - Department of Environmental Protection
   Subtitle E. Division of Fish, Game and Shellfisheries

4. Endangered, Threatened, Peripheral, Declining, Undetermined, and Extirpated Wildlife Species in New Jersey - Official List

5. Endangered and Threatened Wildlife and Plants - Native to the United States

6. Sample Land Acquisition Easement Agreement

# APPENDIX I

## Estuarine Sanctuary Guidelines, 1974 and 1977

## DEPARTMENT OF COMMERCE

### National Oceanic and Atmospheric Administration

### [ 15 CFR Part 921 ]

## ESTUARINE SANCTUARY GUIDELINES

### Policies and Procedures for Selection Acquisition and Management

AGENCY: National Oceanic and Atmospheric Administration, Department of Commerce.

ACTION: Proposed rule.

SUMMARY: This proposed rule will allow the National Oceanic and Atmospheric Administration to make a preliminary acquisition grant to a State to undertake a fair market value appraisal, and to develop a uniform relocation act plan, a detailed management plan and a research framework for a proposed estuarine sanctuary, developed pursuant to Section 315 of the Coastal Zone Management Act of 1972, as amended.

DATE: Comments must be received on or before October 1, 1977.

FOR FURTHER INFORMATION CONTACT:

Robert R. Kifer, Physical Scientist, Policy and Programs Development Office, Office of Coastal Zone Management, 3300 Whitehaven Parkway, Page One Building, Washington, D.C. 20235 (202–634–4241).

SUPPLEMENTARY INFORMATION: On June 4, 1974, The National Oceanic and Atmospheric Administration (NOAA) published 15 CFR Part 921 entitled, "Estuarine Sanctuary Guidelines" pursuant to then section 312 of the Coastal Zone Management Act of 1972, as amended, for the purpose of establishing policy and procedures for the selection, acquisition, and management of estuarine sanctuaries.

Under new subsection 315(1) of the Act, the Secretary of Commerce is authorized to make available to coastal States grants of up to 50 per centum of the cost of acquisition, development, and operation of estuarine sanctuaries. In general, subsection 315(1) provides that grants may be awarded to States on a matching basis to acquire, develop, and operate natural areas as estuarine sanctuaries in order that scientists and students may be provided the opportunity to examine over a period of time ecological relationships within the area. The purpose of these guidelines is to implement this program.

As a result of two years of program implementation, the regulations are proposed to be modified to specifically authorize the granting of acquisition money to States in two stages:

(i) An initial grant for such preliminary purposes, as surveying and assessing the land to be acquired, and the development of management procedures and research programs; and

(ii) A second grant for the actual acquisition of the land. The Federal share of the sum of the two grants shall not exceed 50 percent of the acquisition costs involved. Any State receiving an initial grant shall be obligated to repay it if, due to any fault of the State, the sanctuary is not established.

As a result of this new grant procedure, much more information relating to costs, values, management procedures, and research programs will be available at the time of the publication of a draft environmental impact statement. Proposals made public to date in the form of an Environmental Impact Statement (EIS) have been criticized for lack of specificity in these areas. By making a small preliminary acquisition grant to a State, the estuarine sanctuary proposal can be more fully developed and the public can become more aware of the costs and the exact nature of the long-term management.

In response to State questions about estuarine sanctuary research, the proposed regulations provide that such research can be funded if it can be shown to be related to program administration.

NOAA has reviewed these proposed regulations pursuant to the National Environmental Policy Act of 1969 and has determined that promulgation of these regulations will have no significant impact on the environment.

*Compliance with Executive Order 11821.* The economic and inflationary impact of these proposed regulations has been evaluated in accordance with OMB Circular A–107 and it has been determined that no major inflationary impact will result.

Dated: August 26, 1977.

T. P. GLEITER,
*Assistant Administrator for Administration.*

It is proposed to amend 15 CFR Part 921 as follows:

(1) By revising the table of contents and authority citation to read as follows:

**Subpart A—General**



**Subpart B—Application for Grants**



**Subpart C—Selection Criteria**



**Subpart D—Operation**



AUTHORITY: Sec. 315(1), Coastal Zone Management Act of 1972, as amended (90 Stat. 1030, (16 U.S.C. 1461) Pub. L. 94–370).

(2) By revising Subpart B—Application for Grants—as follows:

**Subpart B—Application for Grants**

### § 921.10 General.

Section 315 authorizes Federal grants to coastal States so that the States may establish sanctuaries according to regulations promulgated by the Secretary. Coastal States may file applications for grants with the Associate Administrator for Coastal Zone Management (OCZM), Office of Coastal Zone Management, Page 1, 3300 Whitehaven Parkway NW, Washington, D.C. 20235. That agency which has been certified to the Office of Coastal Zone Management as the entity responsible for administration of the State coastal zone management program may either submit an application directly, or must endorse and approve applications submitted by other agencies within the State.

### § 921.11 Application for preliminary acquisition grants.

(a) A grant may be awarded on a matching basis to cover costs necessary to preliminary actual acquisition of land. As match to the Federal grant, a State may use money, the cost of necessary services, the value of foregone revenue, and/or the value of land either already in its possession or acquired by the State specifically for use in the sanctuary. If the land to be used as match already is in the State's possession and is in a protected status, the State may use such land as match only to the extent of any revenue from the land foregone by the State in order to include it in the sanctuary. Application for a preliminary acquisition grant shall be made on form SF 424 application for Federal assistance (non-construction programs).

(b) A preliminary acquisition grant may be made for the defrayal of the cost of:

(1) An appraisal of the land, or of the value of any foregone use of the land, to be used in the sanctuary;

(2) The development of a Uniform Relocation Assistance and Real Property Acquisition Policies Act plan;

(3) The development of a sanctuary management plan;

(4) The development of a research and educational program; and/or,

(5) Such other activity of a preliminary nature as may be approved in writing by OCZM. Any grant made pursuant to this subsection shall be refunded by the State to whatever extent it has spent in relation to land not acquired for the sanctuary, and if OCZM requests such refund.

(c) The application should contain:

(1) Evidence that the State has conducted a scientific evaluation of its estuaries and selected one of those most representative.

(2) Description of the proposed sanctuary including location, proposed boundaries, and size. A map(s) should be included, as well as an aerial photograph if available.

(3) Classification of the proposed sanctuary according to the biogeographic scheme set forth in § 921.4.

(4) Description of the major physical, geographic, biological characteristics and resources of the proposed sanctuary.

(5) Demonstration of the necessary authority to acquire or control and manage the sanctuary.

(6) Description of existing and potential uses of, and conflicts within, the area if it were not declared an estuarine sanctuary; and potential use restriction and conflicts if the sanctuary is established.

(7) List of protected sites, either within the estuarine sanctuaries program or within other Federal, State, or private programs, which are located in the same region or biogeographic classification.

(8) The manner in which the State solicited the views of interested parties.

(9) In addition to the standard A–95 review procedures, the grant application should be sent to the State Historic Preservation Office for comment to insure compliance with section 106 of the National Preservation Act of 1966.

(d) In order to develop a truly representative scheme of estuarine sanctuaries, the States should coordinate their activities. This will help to minimize the possibility of similar estuarine types being proposed in the same region. The extent to which neighboring States were consulted should be indicated.

**§ 921.12 Application for land acquisition grants.**

(a) Acquisition grants will be made to acquire land and facilities for estuarine sanctuaries that have been thoroughly described in a preliminary acquisition grant application, or where equivalent information is available. Application for an acquisition grant shall be made on SF 424 application for Federal assistance (construction program).

In general, lands acquired pursuant to this subsection are legitimate costs and their fair market value, developed according to Federal appraisal standards, may be included as match. The value of lands donated to the State and cash donations may also be used as match. If the State already owns land which is to be used in the sanctuary, the value of any use of the land foregone by the State in order to include such land in the sanctuary, capitalized over the next 20 years, may be used by the State as match. The value of lands purchased by a State within the boundaries of proposed sanctuaries while an application for a preliminary acquisition grant or land acquisition grant is being considered may also be used as match.

(b) An acquisition application should contain the following information:

(1) Description of any changes in proposed sanctuary from that presented in the preliminary acquisition grant application. If such an application has not been made, then, information equivalent to that required in such a grant application should be provided.

(2) Identification of ownership patterns, proportions of land already in the public domain; fair market value appraisal and Uniform Relocation Act plan.

(3) Description of research programs, potential and committed research organizations or agencies, and benefits to the overall coastal zone management program.

(4) Description of proposed management techniques, including the management agency and proposed budget—including both State and Federal shares.

(5) Description of planned or anticipated land and water use and controls for contiguous lands surrounding the proposed sanctuary (including, if appropriate, an analysis of the desirability of creating a marine sanctuary in adjacent areas).

(6) Assessment of the environmental, and socio-economic impacts of declaring the area an estuarine sanctuary, including the economic impact on the surrounding community and its tax base.

(7) Discussion, including cost and feasibility of alternative methods for acquisition and protection of the area.

**§ 921.13 Application for operation grants.**

(a) Although an acquisition grant application for creation of an estuarine sanctuary should include initial operation costs, subsequent applications may be submitted following acquisition and establishment of an estuarine sanctuary for additional operational funds. As indicated in § 921.11, these costs may include administrative costs necessary to monitor the sanctuary and to protect the integrity of the ecosystem. Extensive management programs, capital expenses, or research will not normally be funded by section 315 grants.

(b) After the creation of an estuarine sanctuary established under this program, applications (Form SF 424) for Federal assistance (non-construction program), for such operational grants should include at least the following information:

(1) Identification of the boundary (map).

(2) Specifications of the research and management programs, including managing agency and techniques.

(3) Detailed budget.

(4) Discussion of recent and projected use of the sanctuary.

(5) Perceived threats to the integrity of the sanctuary.

**§ 921.14 Federally-owned lands.**

(a) Where Federally-owned lands are a part of or adjacent to the area proposed for designation as an estuarine sanctuary, or where the control of land and water uses on such lands is necessary to protect the natural system within the sanctuary, the State should contact the Federal agency maintaining control of the land to request cooperation in providing coordinated management policies. Such lands and State request, and the Federal agency response, should be identified and conveyed to the Office of Coastal Zone Management.

(b) Where such proposed use or control of Federally-owned lands would not conflict with the Federal use of their lands, such cooperation and coordination is encouraged to the maximum extent feasible.

(c) Section 315 grants may not be awarded to Federally-owned lands; however, a similar status may be provided on a voluntary basis for Federally-owned lands under the provisions of the Federal Committee on Ecological Perserves program.

**§ 921.20 [Amended]**

(4) Subpart C—Selection Criteria—is amended by changing the first sentence in § 921.20 to read: "Applications for preliminary acquisition or land acquisition grants to establish estuarine sanctuaries will be reviewed and judged on criteria including:"

(5) Section 921.21 is revised, as follows:

**§ 921.21 Public participation.**

(a) Public participation in the selection of an estuarine sanctuary is required. In the selection process, the selecting entity (see § 921.10) shall seek the views of possibly affected landowners, local governments, and Federal agencies, and shall seek the views of possibly interested other parties and organizations. The latter would include, but need not be limited to, private citizens and business, social, and environmental organizations in the area of the site being considered for selection. This solicitation of views may be accomplished by whatever means the selecting entity deems appropriate, but shall include at least one public hearing in the area. Notice of such hearing shall include information as to the time, place, and subject matter, and shall be published in the principal area media. The hearing shall be held no sooner than 15 days following the publication of notice.

(b) The Office of Coastal Zone Management (OCZM) shall prepare draft and final environmental impact statements pertaining to the site finally selected for the estuarine sanctuary following public participation in the selection of that site, and shall distribute these as appropriate. OCZM may hold a public hearing in the area of such site at which both the draft environmental impact statement (DEIS) and the merits of the site selection may be addressed by those in attendance. OCZM shall hold such a hearing if: (1) In its view, the DEIS is controversial, or (2) if there appears to be a need for further informing the public with regard to either the DEIS or one or more aspects of the site selected, or (3) if such a hearing is requested in writing (to either the selecting entity or (CZM) by an affected or interested party, or (4) for other good cause. If held, such hearing shall be held no sooner than 30 days following the issuance of the DEIS and no sooner than 15 days after appropriate notice of such hearing has been given in the area by OCZM with the assistance of the selecting entity.

[FR Doc.77-26123 Filed 9-8-77;8:45 am]

necessary to the objectives of the grant project. As used herein the terms "cost" and "grant project" pertain to both the Federal grant and the matching share. The allowability of cost will be determined in accordance with the provisions of FMC 74-4: Cost Principles applicable to Grants and Contracts with State and Local Governments, and with the guidance contained in section 920 42(b)(3).

(f) The Form SF-424, Application for Federal Assistance (Non-Construction Programs), constitutes the formal application and must be submitted 60 days prior to the desired grant beginning date. The application must be accompanied by evidence of compliance with A-95 requirements including the resolution of any problems raised by the proposed project. The Associate Administrator will not accept application substantially deficient in adherence to A-95 requirements.

(g) In Part IV, Program Narrative of the Form SF-424, the applicant should repond to the following requirements:

(1) Set forth a work program describing the activities to be undertaken during the grant period. This work program shall include:

(i) A precise description of each major task to be undertaken to resolve section 306 deficiencies, and a specific timetable for remedying these deficiencies;

(ii) A precise description of implementation activities for approved management components, including a demonstration that these implementation funds will not be applied outside the approved coastal management boundaries;

(iii) A precise description of any other tasks necessary for and allowable under subsection 305(d);

(iv) For each task, identify any "Other Entities," as defined in the "Manual," that will be allocated responsibility for carrying out all or portions of the task, and indicate the estimated cost of the subcontract for each allocation. Identify, if any, that portion of the task that will be carried out under contract with consultants and indicate the estimated cost of such contract(s); and

(v) For each task, indicate the estimated total cost. Also, indicate the estimated total months of effort, if any, allocated to the task from the applicant's staff.

(2) The sum of all task costs in the above paragraph should equal the total estimated grant project cost.

(3) Using two categories, Professional and Clerical, indicate the total number of personnel in each category on the applicant's staff that will be assigned to the grant project. Also indicate the number assigned full time and the number assigned less than full time in the two categories. Additionally, indicate the number of new positions created in the two categories as a result of the grant project.

# PART 921—ESTUARINE SANCTUARY GUIDELINES

## Subpart A—General

Sec.



## Subpart B—Application for Grants



## Subpart C—Selection Criteria



## Subpart D—Operation



AUTHORITY: Sec. 312, Pub. L. 92-583, as amended; 86 Stat. 1280 (16 USC 1461).

SOURCE: 39 FR 19924, June 4, 1974, unless otherwise noted.



## Subpart A—General

### § 921.1 Policy and Objectives.

The estuarine sanctuaries program will provide grants to States on a matching basis to acquire, develop and operate natural areas as estuarine sanctuaries in order that scientists and students may be provided the opportunity to examine over a period of time the ecological relationships within the area. The purpose of these guidelines is to establish the rules and regulations for implementation of the program.

### § 921.2 Definitions.

(a) In addition to the definitions found in the Act and in the regulations dealing with Coastal Zone Management Program Development Grants published November 29, 1973 (Part 920 of this chapter) the term "estuarine sanctuary" as defined in the Act, means a research area which may include any part or all of an estuary, adjoining transitional areas, and adjacent uplands, constituting to the extent feasible a natural unit, set aside to provide scientists and students the opportunity to examine over a period of time the ecological relationships within the area.

(b) For the purposes of this section, "estuary" means that part of a river or stream or other body of water having unimpaired connection with the open sea where the seawater is measurably diluted with freshwater derived from land drainage. The term includes estuary-type areas of the Great Lakes as well as lagoons in more arid coastal regions.

(c) The term "multiple use" as used in this section shall mean the simultaneous utilization of an area or resource for a variety of compatible purposes or to provide more than one benefit. The term implies the long-term, continued uses of such resources in such a fashion that other uses will not interfere with, diminish or prevent the primary purpose, which is the long-term protection of the area for scientific and educational use.

### § 921.3 Objectives and implementation of the program.

(a) General. The purpose of the estuarine sanctuaries program is to create natural field laboratories in which to gather data and make studies of the natural and human processes occurring within the estuaries of the coastal zone. This shall be accomplished by the establishment of a series of estuarine sanctuaries which will be designated so that at least one representative of each type of estuarine ecosystem will endure into the future for scientific and educational purposes. The primary use of estuarine sanctuaries shall be for research and educational purposes, especially to provide some of the information essential to coastal zone management decision-making. Specific examples of such purposes and uses include but are not limited to:

(1) To gain a thorough understanding of the ecological relationships within the estuarine environment.

(2) To make baseline ecological measurements.

(3) To monitor significant or vital changes in the estuarine environment.

(4) To assess the effects of man's stresses on the ecosystem and to forecast and mitigate possible deterioration from human activities.

(5) To provide a vehicle for increasing public knowledge and awareness of the complex nature of estuarine systems, their values and benefits to man and nature, and the problems which confront them.

(b) The emphasis within the program will be on the designation as estuarine sanctuaries of areas which will serve as natural field laboratories for studies and investigations over an extended period. The area chosen as an estuarine sanctuary shall, to the extent feasible, include water and land masses constituting a natural ecological unit.

(c) In order that the estuarine sanctuary will be available for future studies, research involving the destruction of any portion of an estuarine sanctuary which would permanently alter the nature of the ecosystem shall not normally be permitted. In the unusual circumstances where permitted, ma-

nipulative field research shall be carefully controlled. No experiment which involves manipulative research shall be initiated until the termination date is specified and evidence given that the environment will be returned to its condition which existed prior to the experiment.

(d) It is anticipated that most of the areas selected as sanctuaries will be relatively undisturbed by human activities at the time of acquisition. Therefore, most of the areas selected will be areas with a minimum of development, industry or habitation.

(e) If sufficient permanence and control by the State can be assured, the acquisition of a sanctuary may involve less than the acquisition of a fee simple interest. Such interest may be, for example, the acquisition of a conservation easement, "development rights", or other partial interest sufficient to assure the protection of the natural system. Leasing, which would not assure permanent protection of the system, would not be an acceptable alternative.

### § 921.4 Biogeographic classification.

(a) It is intended that estuarine sanctuaries should not be chosen at random, but should reflect regional differentiation and a variety of ecosystems so as to cover all significant variations. To ensure adequate representation of all estuarine types reflecting regional differentiation and a variety of ecosystems, selections will be made by the Secretary from the following biogeographic classifications:

1. *Arcadian.* Northeast Atlantic coast south to Cape Cod, glaciated shoreline subject to winter icing; well developed algal flora; boreal biota.

2. *Virginian.* Middle Atlantic coast from Cape Cod to Cape Hatteras; lowland streams, coastal marshes and muddy bottoms; characteristics transitional between 1 and 3; biota primarily temperate with some boreal representatives.

3. *Carolinian.* South Atlantic coast, from Cape Hatteras to Cape Kennedy; extensive marshes and swamps; waters turbid and productive; biota temperate with seasonal tropical elements.

4. *West Indian.* South Florida coast from Cape Kennedy to Cedar Key; and Caribbean Islands; shoreland low-lying limestone; calcareous sands, marls and coral reefs; coastal marshes and mangroves; tropical biota.

5. *Louisianian.* Northern Gulf of Mexico, from Cedar Key to Mexico; characteristics of 3, with components of 4; strongly influenced by terrigenous factors; biota primarily temperate.

6. *Californian.* South Pacific coast from Mexico to Cape Mendocino; shoreland influenced by coastal mountains; rocky coasts with reduced fresh-water runoff; general absence of marshes and swamps; biota temperate.

7. *Columbian.* North Pacific coast from Cape Mendocino to Canada; mountainous shoreland; rocky coasts; extensive algal communities; biota primarily temperate with some boreal.

8. *Fiords.* South coast Alaska and Aleutians; precipitous mountains; deep estuaries, some with glaciers; shoreline heavily indented and subject to winter icing; biota boreal to sub-Arctic.

9. *Subarctic.* West and north coasts of Alaska; ice stressed coasts; biota Arctic and sub-Arctic.

10. *Insular.* Larger islands, sometimes with precipitous mountains; considerable wave action; frequently with endemic species; larger island groups primarily with tropical biota.

11. *Great Lakes.* Great Lakes of North America; bluff-dune or rocky, glaciated shoreline; limited wetlands; freshwater only; biota a mixture of boreal and temperate species with anadromous species and some marine invaders.

(b) Various sub-categories will be developed and utilized as appropriate.

### § 921.5 Multiple use.

(a) While the primary purpose of estuarine sanctuaries is to provide long-term protection for natural areas so that they may be used for scientific and educational purposes, multiple use of estuarine sanctuaries will be encouraged to the extent that such use is compatible with this primary sanctuary purpose. The capacity of a given sanctuary to accommodate additional uses, and the kinds and intensity of such use, will be determined on a case by case basis. While it is anticipated that compatible uses may generally include activities such as low intensity recreation, fishing, hunting, and wildlife observation, it is recognized that the exclusive use of an area for scientific or educational purposes may provide the optimum benefit to coastal zone management and resource use and may on occasion be necessary.



(b) There shall be no effort to balance or optimize uses of an estuarine sanctuary on economic or other bases. All additional uses of the sanctuary are clearly secondary to the primary purpose and uses, which are long-term maintenance of the ecosystem for scientific and educational uses. Non-compatible uses, including those uses which would cause significant short or long-term ecological change or would otherwise detract from or restrict the use of the sanctuary as a natural field laboratory, will be prohibited.

### § 921.6 Relationship to other provisions of the act and to marine sanctuaries.

(a) The estuarine sanctuary program must interact with the overall coastal zone management program in two ways: (1) the intended research use of the sanctuary should provide relevant data and conclusions of assistance to coastal zone management decision-making, and (2) when developed, the State's coastal zone management program must recognize and be designed to protect the estuarine sanctuary; appropriate land and water use regulations and planning considerations must apply to adjacent lands. Although estuarine sanctuaries should be incorporated into the State coastal zone management program, their designation need not await the development and approval of the management program where operation of the estuarine sanctuary would aid in the development of a program.

(b) The estuarine sanctuaries program will be conducted in close cooperation with the marine sanctuaries program (Title III of the Marine Protection, Research Act of 1972, Pub. L. 92-532, which is also administered by the Office of Coastal Zone Management, NOAA), which recognizes that certain areas of the ocean waters, as far seaward as the outer edge of the Continental Shelf, or other coastal waters where the tide ebbs and flows, or of the Great Lakes and their connecting waters, need to be preserved or restored for their conservation, recreational, ecologic or esthetic values. It is anticipated that the Secretary on occasion may establish marine sanctuaries to complement the designation by States of estuarine sanctuaries, where this may be mutually beneficial.

## Subpart B—Application for Grants

### § 921.10 General.

Section 312 authorizes Federal grants to coastal States so that the States may establish sanctuaries according to regulations promulgated by the Secretary. Coastal States may file applications for grants with the Director, Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Rockville, Maryland 20852. That agency which has been certified to the Office of Coastal Zone Management as the entity responsible for administration of the State coastal zone management program may either submit an application directly, or must endorse and approve applications submitted by other agencies within the State.

### § 921.11 Application for initial acquisition, development and operation grants.

(a) Grants may be awarded on a matching basis to cover the costs of acquisition, development and operation of estuarine sanctuaries. States may use donations of land or money to satisfy all or part of the matching cost requirements.

(b) In general, lands acquired pursuant to this section, including State owned lands but not State owned submerged lands or bay bottoms, that occur within the proposed sanctuary boundary are legitimate costs and their fair market value may be included as match. However, the value of lands donated to or by the State for inclusion in the sanctuary may only be used to match other costs of land acquisition. In the event that lands already exist in a protected status, their value cannot be used as match for sanctuary development and operation grants, which will require their own matching funds.

(c) Development and operation costs may include the administrative expenses necessary to minitor the sanctuary, to ensure its continued viability

and to protect the integrity of the ecosystem. Research will not normally be funded by Section 312 grants. It is anticipated that other sources of Federal, State and private funds will be available for research in estuarine sanctuaries.

(d) Initial applications should contain the following information:

(1) Description of the proposed sanctuary include location, boundaries, size and cost of acquisition, operation and development. A map should be included, as well as an aerial photograph, if available.

(2) Classification of the proposed sanctuary according to the biogeographic scheme set forth in § 921.4.

(3) Description of the major physical, geographic and biological characteristics and resources of the proposed sanctuary.

(4) Identification of ownership patterns; proportion of land already in the public domain.

(5) Description of intended research uses, potential research organizations or agencies and benefits to the overall coastal zone management program.

(6) Demonstration of necessary authority to acquire or control and manage the sanctuary.

(7) Description of proposed management techniques, including the management agency, principles and proposed budget including both State and Federal shares.

(8) Description of existing and potential uses of and conflicts within the area if it were not declared an estuarine sanctuary; potential use, use restrictions and conflicts if the sanctuary is established.

(i) Assessment of the environmental and socio-economic impacts of declaring the area an estuarine sanctuary, including the economic impact of such a designation on the surrounding community and its tax base.

(9) Description of planned or anticipated land and water use and controls for contiguous lands surrounding the proposed sanctuary (including if appropriate an analysis of the desirability of creating a marine sanctuary in adjacent areas).

(10) List of protected sites, either within the estuarine sanctuaries program or within other Federal, State or private programs, which are located in the same regional or biogeographic classification.

(i) It is essential that the opportunity be provided for public involvement and input in the development of the sanctuary proposal and application. Where the application is controversial or where controversial issues are addressed, the State should provide adequate means to ensure that all interested parties have the opportunity to present their views. This may be in the form of an adequately advertised public hearing.

(ii) During the development of an estuarine sanctuary application, all landowners within the proposed boundaries should be informed in writing of the proposed grant application.

(iii) The application should indicate the manner in which the State solicited the views of all interested parties prior to the actual submission of the application.

(e) In order to develop a truly representative scheme of estuarine sanctuaries, the States should attempt to coordinate their activities. This will help to minimize the possibility of similar estuarine types being proposed for designation in the same region. The application should indicate the extent to which neighboring States were consulted.

(f) Discussion, including cost and feasibility, of alternative methods for acquisition, control and protection of the area to provide similar uses. Use of the marine sanctuary authority and funds from the Land and Water Conservation Fund Act should be specifically addressed.

### § 921.12 Application for subsequent development and operation grants.

(a) Although the initial grant application for creation of an estuarine sanctuary should include initial development and operation costs, subsequent applications may be submitted following acquisition and establishment of an estuarine sanctuary for additional development and operation funds. As indicated in § 921.11, these costs may include administrative costs necessary to monitor the sanctuary



and to protect the integrity of the ecosystem. Extensive management programs, capital expenses, or research will not normally be funded by section 312 grants.

(b) After the creation of an estuarine sanctuary established under this program, applications for such development and operation grants should include at least the following information:

(1) Identification of the boundary.

(2) Specifications of the management program, including managing agency and techniques.

(3) Detailed budget.

(4) Discussion of recent and projected use of the sanctuary.

(5) Perceived threats to the integrity of the sanctuary.

### § 921.13 Federally owned lands.

(a) Where federally owned lands are a part of or adjacent to the area proposed for designation as an estuarine sanctuary, or where the control of land and water uses on such lands is necessary to protect the natural system within the sanctuary, the State should contact the Federal agency maintaining control of the land to request cooperation in providing coordinated management policies. Such lands and State request, and the Federal agency response, should be identified and conveyed to the Office of Coastal Zone Management.

(b) Where such proposed use or control of federally owned lands would not conflict with the Federal use of their lands, such cooperation and coordination is encouraged to the maximum extent feasible.

(c) Section 312 grants may not be awarded to federal agencies for creation of estuarine sanctuaries in Federally owned lands; however, a similar status may be provided on a voluntary basis for Federally owned lands under the provisions of the Federal Committee on Ecological Preserves program.

### § 921.14 Application time schedule and procedure.

(a) Effective January 1, 1975, the review and selection of estuarine sanctuary applications will be conducted on a twice yearly basis. All applications received between January 1 and June 30 of any year will be considered together beginning July 1 of that year; applications received between July 1 and December 31 will be considered together beginning January 1 of the following year.

(b) All applications received during any application period will be subject to simultaneous review and consideration. At the end of each application period, a suitable number of applications, based on the level of funding available, will be selected for further review and processing. Unless sufficiently distinguished as major subcategories, no more than one application from each biogeographic category will be selected for final processing during each review period. Normally, the applications selected will be processed and the grants awarded within 6 months from the end of the application period, that is before the next review period begins. Applications which are not selected for processing may be resubmitted for consideration during the next review period.

(c) At least ninety (90) days prior to submission of an application under this section, an applicant state must notify in writing the OCZM, appropriate state and regional A-95 clearinghouses, and other states within the same biogeographic category (see Table 1) of its intention to file an application for an estuarine sanctuary grant. Such notification should include at least the identification of the state agency applying for the grant; the geographic location of the proposed sanctuary and its boundaries; proposed objectives of the sanctuary, including intended research uses; estimated cost of sanctuary; and estimated date for submission of application. Copies of the A-95 notifications to the state and regional clearinghouse would be considered sufficient and desirable notification to OCZM and to the other states.

TABLE 1—LIST OF STATES BY BIOGEOGRAPHIC CLASSIFICATION

1. Acadian—Maine, New Hampshire, Massachusetts.

2. Virginian—Massachusetts, Rhode Island, Connecticut, New York, New Jersey,

Delaware, Maryland, Virginia, North Carolina.

3. Carolinian—North Carolina, South Carolina, Georgia, Florida.

4. West Indian—Florida, Puerto Rico, Virgin Islands.

5. Louisianian—Florida, Mississippi, Alabama.

6. Californian—California.

7. Columbian—California, Oregon, Washington.

8. Fiord—Alaska.

9. Sub-Arctic—Alaska.

10. Insular—Hawaii, Guam, American Samoa.

11. Great Lakes—Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, Pennsylvania, New York.

(d) The Director of OCZM may, upon the finding of extenuating circumstances relating to applications for assistance, waive appropriate administrative requirements contained herein.

[39 FR 45214, Dec. 31, 1974]

## Subpart C—Selection Criteria

### § 921.20 Criteria for selection.

Applications for grants to establish estuarine sanctuaries will be reviewed and judged on criteria including:

(a) Benefit to the coastal zone management program. Applications should demonstrate the benefit of the proposal to the development or operations of the overall coastal zone management program, including how well the proposal fits into the national program of representative estuarine types; the national or regional benefits; and the usefulness in research.

(b) The ecological characteristics of the ecosystem, including its biological productivity, diversity and representativeness. Extent of alteration of the natural system, its ability to remain a viable and healthy system in view of the present and possible development of external stresses.

(c) Size and choice of boundaries. To the extent feasible, estuarine sanctuaries should approximate a natural ecological unit. The minimal acceptable size will vary greatly and will depend on the nature of the ecosystem.

(d) Cost. Although the Act limits the Federal share of the cost for each sanctuary to $2,000,000, it is anticipated that in practice the average grant will be substantially less than this.

(e) Enhancement of non-competitive uses.

(f) Proximity and access to existing research facilities.

(g) Availability of suitable alternative sites already protected which might be capable of providing the same use or benefit. Unnecessary duplication of existing activities under other programs should be avoided. However, estuarine sanctuaries might be established adjacent to existing preserved lands where mutual enhancement or benefit of each might occur.

(h) Conflict with existing or potential competing uses.

(i) Compatibility with existing or proposed land and water use in contiguous areas.

If the initial review demonstrates the feasibility of the application, an environmental impact statement will be prepared by the Office of Coastal Zone Management in accordance with the National Environmental Policy Act of 1969 and implementing CEQ guidelines.

### § 921.21 Public participation.

Public participation will be an essential factor in the selection of estuarine sanctuaries. In addition to the participation during the application development process (§ 921.11(e)), public participation will be ensured at the Federal level by the NEPA process and by public hearings where desirable subsequent to NEPA. Such public hearings shall be held by the Office of Coastal Zone Management in the area to be affected by the proposed sanctuary no sooner than 30 days after it issues a draft environmental impact statement on the sanctuary proposal. It will be the responsibility of the Office of Coastal Zone Management, with the assistance of the applicant State, to issue adequate public notice of its intention to hold a public hearing. Such public notice shall be distributed widely, especially in the area of the proposed sanctuary; affected property owners and those agencies, organizations or individuals with an identified interest in the area or estuarine sanctuary program shall be notified of the public hearing. The public notice shall contain the name, address and phone number of the appropriate Federal and State officials to contact for additional information about the proposal.



## Subpart D—Operation

### § 921.30 General.

Management of estuarine sanctuaries shall be the responsibility of the applicant State or its agent. However, the research uses and management program must be in conformance with these guidelines and regulations, and others implemented by the provisions of individual grants. It is suggested that prior to the grant award, representatives of the proposed sanctuary management team and the Office of Coastal Zone Management meet to discuss management policy and standards. It is anticipated that the grant provisions will vary with individual circumstances and will be mutually agreed to by the applicant and the granting agency. As a minimum, the grant document for each sanctuary shall:

(a) Define the intended research purposes of the estuarine sanctuary.

(b) Define permitted, compatible, restricted and prohibited uses of the sanctuary.

(c) Include a provision for monitoring the uses of the sanctuary, to ensure compliance with the intended uses.

(d) Ensure ready access to land use of the sanctuary by scientists, students and the general public as desirable and permissible for coordinated research and education uses, as well as for other compatible purposes.

(e) Ensure public availability and reasonable distribution of research results for timely use in the development of coastal zone management programs.

(f) Provide a basis for annual review of the status of the sanctuary, its value to the coastal zone program.

(g) Specify how the integrity of the system which the sanctuary represents will be maintained.

(h) Provide adequate authority and intent to enforce management policy and use restrictions.

### § 921.31 Changes in the sanctuary boundary, management policy or research program.

(a) The approved sanctuary boundaries; management policy, including permissible and prohibited uses; and research program may only be changed after public notice and the opportunity of public review and participation such as outlined in § 921.21.

(b) Individuals or organizations which are concerned about possible improper use or restriction of use of estuarine sanctuaries may petition the State management agency and the Office of Coastal Zone Management directly for review of the management program.

### § 921.32 Program review.

It is anticipated that reports will be required from the applicant State on a regular basis, no more frequently than annually, on the status of each estuarine sanctuary. The estuarine sanctuary program will be regularly reviewed to ensure that the objectives of the program are being met and that the program itself is scientifically sound. The key to the success of the estuarine sanctuaries program is to assure that the results of the studies and research conducted in these sanctuaries are available in a timely fashion so that the States can develop and administer land and water use programs for the coastal zone. Accordingly, all information and reports, including annual reports, relating to estuarine sanctuaries shall be part of the public record and available at all times for inspection by the public.

# PART 922—MARINE SANCTUARIES

## Subpart A—General

Sec.

# TITLE 7
# DEPARTMENT OF ENVIRONMENTAL PROTECTION

## SUBTITLE B. DIVISION OF PARKS AND FORESTRY

NOTE: The complete content of this text was too voluminous to include in the DEIS. Readers that require specific sections of this authority are requested to contact: Mr. Richard Kantor, NJ DEP, Division of Coastal Resources CN 401, Trenton, New Jersey 08625.

# CHAPTER 2

# STATE PARK SERVICE

Authority

Unless otherwise expressly noted, all provisions of this chapter were adopted by the Department of Environmental Protection pursuant to authority delegated at N.J.S.A. 13:8-20 et seq. and were filed and became effective prior to September 30, 1969.

Executive Order 66(1978) Expiration Date
This chapter shall expire on July 13, 1983.

## CHAPTER TABLE OF CONTENTS

# TITLE 7
# DEPARTMENT OF ENVIRONMENTAL PROTECTION

## SUBTITLE E. DIVISION OF FISH, GAME AND SHELLFISHERIES

NOTE: The complete content of this text was too voluminous to include in the DEIS. Readers that require specific sections of this authority are requested to contact: Mr. Richard Kantor, NJ DEP, Division of Coastal Resources, CN 401, Trenton, New Jersey 08625.

# CHAPTER 25

# DIVISION OF FISH, GAME AND SHELLFISHERIES

Authority

Unless otherwise expressly noted, all provisions of this chapter were adopted by the Department of Environmental Protection pursuant to authority delegated at N.J.S.A. 13:1B-30 et seq., N.J.S.A. 23:1-1 et seq., and N.J.S.A. 23:4-28, and were filed and became effective before September 1, 1969.

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## SUBCHAPTER 1. GENERAL PROVISIONS

### 7:25-1.1 Scope

Unless otherwise provided, the following shall constitute supplements to the statutes governing fish and game laws.

### 7:25-1.2 Construction

These rules shall be liberally construed to permit the department, the Division of Fish, Game and Shellfisheries and its various agencies to discharge its statutory functions.

APPENDIX 4

# ENDANGERED, THREATENED, PERIPHERAL, DECLINING, UNDETERMINED AND EXTIRPATED WILDLIFE SPECIES IN NEW JERSEY

- Official List -

STATE OF NEW JERSEY

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF FISH, GAME AND SHELLFISHERIES

Prepared by:

Endangered and Nongame Species Project

Russell A. Cookingham
Director

March 29, 1979

Nomenclature References

## FISH

American Fisheries Society 1960. "A List of Common and Scientific Names of Fishes from the United States and Canada." 2nd Edition Baltimore: Waverly Press, Inc.

## REPTILES AND AMPHIBIANS

Conant, Roger 1975. "A Field Guide to Reptiles and Amphibians of Eastern and Central North America." 2nd Edition Boston: Houghton Miflin Company

## BIRDS

American Ornithologists' Union 1957. Checklist of North American Birds. 5th Edition Baltimore: American Ornithologists' Union

## MAMMALS

Hall, E. Raymond, and Keith R. Kelson 1959. "The Mammals of North America." 2 Volumes. New York: Ronald Press

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### FISH

Kenneth Able - Associate Professor of Biology, Rutgers University, New Brunswick

Paul E. Hamer - Principal Biologist, Bureau of Fisheries Management, Division of Fish, Game and Shellfisheries

Robert Hastings - Associate Professor of Biology, Rutgers University, Camden

John F. McClain - Assistant Biologist, Bureau of Fisheries Management, Division of Fish, Game and Shellfisheries

Walter S. Murawski - Principle Fisheries Biologist, Bureau of Fisheries Management Division of Fish, Game and Shellfisheries

John B. Pearce - Chief, Division of Environmental Assessment, National Marine Fisheries Service, Northeast Fisheries Center, Sandy Hook Laboratory

A. Bruce Pyle - Chief, Bureau of Fisheries Management, Division of Fish, Game and Shellfisheries

### AMPHIBIANS AND REPTILES

Irving H. Black - Superintendent of Science Department, Newark Museum

Roger Conant - Adjunct Professor of Biology, University of New Mexico

Kenneth Gosner - Curator of Zoology, Newark Museum

Joseph M. Pylka - Auditory Research Lab, Princeton University

Richard Ryan - Director, Turtle Back Zoo, West Orange, New Jersey

Raymond J. Stein - Curator of Science, New Jersey State Museum

Robert T. Zappalorti - Executive Director, Herpetological Associates, Staten Island, New York

J. Kevin Bowler - Curator of Reptiles, Philadelphia Zoological Gardens

## BIRDS

Irving H. Black - Newark Museum

Ernest A. Choate - Ornithologist, Cape May

A. Morton Cooper - Dover Township Environmental Commission

Frank B. Gill - Director of Systematics and Evolutionary Biology
Philadelphia Academy of Natural Sciences

Richard Kane - Director, Scherman Sanctuary, New Jersey Audubon Society

Charles F. Leck - Assistant Professor, Department of Zoology,
Rutgers University

Richard Ryan - Director, Turtle Back Zoo, West Orange, New Jersey

## MAMMALS

Julia Chase - Professor of Biology, Barnard College

John J. McManus - Assistant Professor of Biology, Fairleigh Dickenson
University

Robert Schoelkopf - Director, Marine Mammal Stranding Center, Atlantic City

Raymond J. Stein - Curator of Science, New Jersey State Museum

Frederick A. Ulmer, Jr. - (Retired) Curator of Mammals, Philadelphia
Zoological Gardens

Steven Viola - Assistant Curator of Mammals, Philadelphia Zoological Gardens

## GENERAL

James E. Applegate - Assistant Professor of Wildlife Biology,
Rutgers University

Robert E. Eriksen - Assistant Wildlife Biologist, Bureau of Wildlife Management,
Division of Fish, Game and Shellfisheries

George P. Howard - Chief, Bureau of Wildlife Management, Division of Fish,
Game and Shellfisheries

Ichthyological Associates - Marine ecological studies

Robert C. Lund - Principal Biologist, Research Supervisor, Bureau of Wildife
Management, Division of Fish, Game and Shellfisheries

Jack McCormick and Associates, Inc. - Ecological Conservation Association

Joseph Penkala - Assistant Wildlife Biologist, Project Leader, Upland Game,
Bureau of Wildlife Management, Division of Fish, Game and
Shellfisheries

## DEFINITIONS

ENDANGERED - An endangered species is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of or change in habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.

THREATENED - May become endangered if conditions surrounding the species begin to or continue to deteriorate.

PERIPHERAL - A species whose occurence in New Jersey is at the extreme edge of its present natural range.

UNDETERMINED - A species about which there is not enough information available to determine the status.

DECLINING - A species which has exhibited a continued decline in population numbers over the years.

EXTIRPATED - A species that formerly occurred in New Jersey, but is not now known to exist within the state.

SPECIAL CASE - Species not known to nest regularly in New Jersey (marine reptiles) but that do occur off our shores - some occurring with regularity close to our shores or in our bays (marine reptiles and mammals).

# ENDANGERED SPECIES IN NEW JERSEY

## FISH

| | |
|---|---|
| Shortnose Sturgeon | *Acipenser brevirostrum* |

## AMPHIBIANS

| | |
|---|---|
| Tremblay's Salamander | *Ambystoma tremblayi* |
| Blue-spotted Salamander | *Ambystoma laterale* |
| Eastern Tiger Salamander | *Ambystoma tigrinum* |
| Pine Barrens Treefrog | *Hyla andersoni* |
| Southern Gray Treefrog | *Hyla chrysoscelis* |

## REPTILES

| | |
|---|---|
| Bog Turtle | *Clemmys muhlenbergi* |
| Timber Rattlesnake | *Crotalus horridus horridus* |

## BIRDS

| | |
|---|---|
| b Bald Eagle | *Haliaeetus leucocephalus* |
| Peregrine Falcon | *Falco peregrinus* |
| b Osprey | *Pandion haliaetus* |
| b Cooper's Hawk | *Accipter cooperii* |
| b Least Tern | *Sterna albifrons* |
| b Black Skimmer | *Rynchops niger* |

## MAMMALS

| | |
|---|---|
| Indiana Bat | *Myotis sodalis* |

## SPECIAL CASE

## MARINE REPTILES

| | |
|---|---|
| Atlantic Hawksbill | *Eretmochelys imbricata* |
| Atlantic Loggerhead | *Caretta caretta* |
| Atlantic Ridley | *Lepidochelys kempi* |
| Atlantic Leatherback | *Dermochelys coriacea* |

## MARINE MAMMALS

| | |
|---|---|
| Sperm Whale | *Physeter macrocephalus* |
| Blue Whale | *Balaenoptera musculus* |
| Fin Whale | *Balaenoptera physalus* |
| Sei Whale | *Balaenoptera borealis* |
| Humpback Whale | *Megaptera novaeangliae* |
| Atlantic Right Whale | *Eubalaena glacialis* |

b = breeds in New Jersey

# THREATENED SPECIES IN NEW JERSEY

## FISH

| | |
|---|---|
| Atlantic Sturgeon | Acipenser oxyrhynchus |
| American Shad | Alosa sapidissima |
| Brook Trout (native) | Salvelinus fontinalis |
| Atlantic Tomcod | Microgadus tomcod |

## AMPHIBIANS

| | |
|---|---|
| Long-tailed Salamander | Eurycea longicauda |
| Eastern Mud Salamander | Pseudotriton montanus |

## REPTILES

| | |
|---|---|
| Wood Turtle | Clemmys insculpta |
| Corn Snake | Elaphe guttata |
| Northern Pine Snake | Pituophis melanoleucus melanoleucus |

## BIRDS

| | |
|---|---|
| b Pied-billed Grebe | Podilymbus podiceps |
| b Great Blue Heron | Ardea herodias |
| b Red-shouldered Hawk | Buteo lineatus |
| b Marsh Hawk | Circus cyaneus[1] |
| Merlin | Falco columbarius |
| b Upland Sandpiper (Plover) | Bartramia longicauda |
| b Roseate Tern | Sterna dougallii |
| b Barred Owl | Strix varia |
| b Short-eared Owl | Asio flammeus[1] |
| b Red-headed Woodpecker | Melanerpes erythrocephalus |
| b Cliff Swallow | Petrochelidon pyrrhonota[1] |
| Short-billed Marsh Wren | Cistothorus platensis |
| b Bobolink | Dolichonyx oryzivorus[1] |
| b Savannah Sparrow | Passerculus sandwichensis[1] |
| b Ipswich Sparrow | Passerculus sandwichensis princeps |
| b Grasshopper Sparrow | Ammodramus savannarum[1] |
| b Vesper Sparrow | Pooecetes gramineus[1] |

SPECIAL CASE

## MARINE REPTILES

| | |
|---|---|
| Atlantic Green Turtle | Chelonia mydas |

b = breeds in New Jersey

[1] Status designation applicable to breeding population only

PERIPHERAL SPECIES IN NEW JERSEY

FISH

| | |
|---|---|
| White Shark | Carcharodon carcharias |
| Smooth Hammerhead | Sphyrna zygaena |
| Thorny Skate | Raja radiata |
| Spotted Eagle Ray | Aetobatus narinara |
| Ladyfish | Elops saurus |
| Tarpon | Megalops atlantica |
| Snakefish | Trachinocephalus myops |
| Haddock | Melanogrammus aeglefinus |
| White Hake | Urophycis tenuis |
| Halfbeak | Hyporhamphus unifasciatus |
| Houndfish | Tylosurus crocodilus |
| Bluespotted Cornetfish | Fistularia tabacaria |
| Longspine Snipefish | Macrorhamphosus scolopax |
| Gag | Mycteroperca microlepis |
| Snowy Grouper | Epinephelus niveatus |
| Warsaw Grouper | Epinephelus nigritus |
| Glasseye Snapper | Priacanthus cruentatus |
| Bigeye | Priacanthus arenatus |
| Short Bigeye | Pristigenys alta |
| Cobia | Rachycentron canadum |
| Bluerunner | Caranx crysos |
| Crevalle Jack | Caranx hippos |
| Horse-eye Jack | Caranx latus |
| Round Scad | Decapterus punctatus |
| Leatherjacket | Oligoplites saurus |
| Bigeye Scad | Selar crumenophthalmus |
| Lookdown | Selene vomer |
| Greater Amberjack | Seriola dumerili |
| Banded Rudderfish | Seriola zonata |
| Florida Pompano | Trachinotus carolinus |
| Permit | Trachinotus falcatus |
| Palometa | Trachinotus glaucus |
| Rough Scad | Trachurus lathami |
| Atlantic Moonfish | Vomer setapinnis |
| Dolphin | Coryphaena hippurus |
| Spotfin Mojarra | Eucinostomus argenteus |
| Gray Snapper | Lutjanus griseus |
| Spottail Pinfish | Diplodus holbrooki |
| Pinfish | Lagodon rhomboides |
| Spotted Seatrout | Cynoscion nebulosus |
| Banded Drum | Larimus fasciatus |
| Atlantic Croaker | Micropogon undulatus |
| Red Drum | Sciaenops ocellata |
| Red Goatfish | Mullus auratus |

PERIPHERAL SPECIES IN NEW JERSEY

## FISH

| | |
|---|---|
| Spotted Goatfish | Psuedupeneus maculatus |
| Atlantic Spadefish | Chaetodipterus faber |
| Foureye Butterflyfish | Chaetodon capistratus |
| Spotfin Butterflyfish | Chaetodon ocellatus |
| Banded Butterflyfish | Chaetodon striatus |
| Sergeant Major | Abudefduf saxatilus |
| Atlantic Threadfin | Polydactylus octonemus |
| Rock Gunnel | Pholis gunnellus |
| Snake Blenny | Lumpenus lumpretaeformis |
| Fat Sleeper | Dormitator maculatus |
| Atlantic Cutlassfish | Trichiurus lepturus |
| Frigate Mackerel | Auxis thazard |
| King Mackeral | Scomberomorus cavalla |
| Spanish Mackerel | Scomberomorus maculatus |
| Barbfish | Scorpaena brasiliensis |
| Spotted Scorpionfish | Scorpaena plumieri |
| Scorpionfish | Scorpaena isthmensis |
| Flounder | Bothus robinsi |
| Flying Gurnard | Dactylopterus volitans |
| Orange Filefish | Aluterus schoepfi |
| Gray Triggerfish | Balistes capriscus |
| Planehead Filefish | Monacanthus hispidus |
| Trunkfish | Lactophrys trigonus |
| Smooth Trunkfish | Lactophrys triqueter |
| Scrawled Cowfish | Lactophrys quadricornis |
| Smooth Puffer | Lagocephalus laevigatus |
| Web Burrfish | Chilomycterus antillarum |
| Striped Burrfish | Chilomycterus schoepfi |

## BIRDS

Migratory birds are not listed, as many appear both spring and fall in New Jersey.

## MAMMALS

| | |
|---|---|
| Porcupine | Erethizon dorsatum |

## SPECIAL CASE

## MARINE MAMMALS

| | |
|---|---|
| Harp Seal | Pagophilus groenlandicus |
| Hooded Seal | Cystophora cristata |
| Gray Seal | Halichoerus grypus |
| Beluga Whale | Delphinapterus leucas |

# DECLINING SPECIES IN NEW JERSEY

## FISH

| | |
|---|---|
| Northern Kingfish | *Menticirrhus saxatilis* |
| Northern Puffer | *Sphaeroides maculatus* |

## AMPHIBIANS

| | |
|---|---|
| Marbled Salamander | *Ambystoma opacum* |
| Spotted Salamander | *Ambystoma maculatum* |
| Four-toed Salamander | *Hemidactylium scutatum* |
| Northern Spring Salamander | *Gyrinophilus porphyriticus porphyriticus* |
| Northern Red Salamander | *Pseudotriton ruber ruber* |
| Eastern Spadefoot Toad | *Scaphiopus holbrooki holbrocki* |

## REPTILES

| | |
|---|---|
| Eastern Hognose Snake | *Heterodon platyrhinos* |

## BIRDS

| | |
|---|---|
| Red-necked Grebe | *Podiceps grisegena* |
| b Yellow-crowned Night Heron | *Nyctanassa violacea* |
| b American Bittern | *Botaurus lentiginosus* |
| b Least Bittern | *Ixobrychus exilis* |
| Baird's Sandpiper | *Calidris bairdii* |
| Marbled Godwit | *Limosa fedoa* |
| Hudsonian Godwit | *Limosa haemastica* |
| b Common Tern | *Sterna hirundo* |
| Razorbill | *Alca torda* |
| Dovekie | *Alle alle* |
| b Whip-poor-will | *Caprimulgus vociferous* |
| b Least Flycatcher | *Empidonax minimus*[1] |
| b Horned Lark | *Eremophila alpestris*[1] |
| b Purple Martin | *Progne subis* |
| b White-eyed Vireo | *Vireo griseus* |
| b Warbling Vireo | *Vireo gilvus* |
| b Yellow-breasted Chat | *Icteria virens* |
| b Hooded Warbler | *Wilsonia citrina* |
| b Eastern Meadowlark | *Sturnella magna*[1] |

b = Breeds in New Jersey

[1] Status designation applicable to breeding population only.

UNDETERMINED SPECIES IN NEW JERSEY

## FISH

| | |
|---|---|
| Shortfin Mako | *Isurus oxyrinchus* |
| Bull Shark | *Carcharhinus leucas* |
| Tiger Shark | *Galeocerdo cuvieri* |
| Clearnose Skate | *Raja eglanteria* |
| Roughtail Stingray | *Dasyatis centroura* |
| Atlantic Stingray | *Dasyatis sabina* |
| Bluntnose Stingray | *Dasyatis sayi* |
| Spiny Butterfly Ray | *Gymnura altavela* |
| Smooth Butterfly Ray | *Gymnura micrura* |
| Bullnose Ray | *Myliobatis freminvillei* |
| Round Herring | *Etrumeus teres* |
| Atlantic Thread Herring | *Opisthonema oglinum* |
| Silver Anchovy | *Anchoviella eurystole* |
| Rainbow Smelt | *Osmerus mordax* |
| Bridle Shiner | *Notropis bifrenatus* |
| Ironcolor Shiner | *Notropis chalybaeus* |
| Bluntnose Minnow | *Pimephales notatus* |
| Fourbeard Rockling | *Enchelyopus cimbrius* |
| Atlantic Cod | *Gadus morhua* |
| Ocean Pout | *Macrozoarces americanus* |
| Spotfin Killifish | *Fundulus luciae* |
| Rough Silverside | *Membras martinica* |
| Threespine Stickleback | *Gasterosteus aculeatus* |
| Ninespine Stickleback | *Pungitius pungitius* |
| Shield Darter | *Percina peltata* |
| Atlantic Pomfret | *Brama brama* |
| Striped Blenny | *Chasmodes bosquianus* |
| Crested Blenny | *Hypleurochilus geminatus* |
| Feather Blenny | *Hypsoblennius hentzi* |
| Darter Goby | *Gobionellus boleosoma* |
| Highfin Goby | *Gobionellus oceanicus* |
| Seaboard Goby | *Gobiosoma ginsburgi* |
| Sharksucker | *Echeneis naucrates* |
| Whitefin Sharksucker | *Echeneis nuecratoides* |
| Little Tuna | *Euthynnus alletteratus* |
| Chub Mackeral | *Scomber colias* |
| Harvestfish | *Peprilus alepidotus* |
| Sea Raven | *Hemitripterus americanus* |
| Grubby | *Myoxocephalus aeneus* |
| Bay Whiff | *Citharichthys spilopterus* |
| Fourspot Flounder | *Paralichthys oblongus* |
| Yellowtail Flounder | *Limanda ferruginea* |

## AMPHIBIANS

| | |
|---|---|
| Jefferson Salamander | *Ambystoma jeffersonianum* |
| Silvery Salamander | *Ambystoma platineum* |
| Mountain Dusky Salamander | *Desmognathus ochrophaeus* |
| Upland Chorus Frog | *Psuedacris triseriata feriarum* |
| Carpenter Frog | *Rana virgatipes* |
| Northern Cricket Frog | *Acris crepitans crepitans* |

## REPTILES

| | |
|---|---|
| Spotted Turtle | Clemmys guttata |
| Map Turtle | Graptemys geographica |
| Red-bellied Turtle | Chrysemys rubriventris |
| Midland Painted Turtle | Chrysemys picta marginata |
| Five-lined Skink | Eumeces fasciatus |
| Ground Skink | Leiolopisma laterale |
| Queen Snake | Natrix septemvittata |
| Eastern Smooth Earth Snake | Virginia valeriae |
| Northern Black Racer | Coluber constrictor constrictor |
| Eastern Smooth Green Snake | Opheodrys vernalis vernalis |
| Black Rat Snake | Elaphe obsoleta obsoleta |
| Eastern King Snake | Lampropeltis getulus getulus |
| Northern Scarlet Snake | Cemophora coccinea copei |
| Northern Copperhead | Agkistrodon contortrix mokasen |
| Eastern Worm Snake | Carphophis amoenus amoenus |

## BIRDS

| | |
|---|---|
| b Black Duck | Anas rubripes |
| b Ruddy Duck | Oxyura jamaicensis |
| b Sharp-shinned Hawk | Accipter gentilis[1] |
| b King Rail | Rallus elegans |
| Yellow Rail | Coturnicops noveboracensis |
| b Black Rail | Laterallus jamaicensis |
| b American Coot | Fulica americana[1] |
| b Piping Plover | Charadrius melodus |
| b Common Snipe | Capella gallinago[1] |
| b Long-eared Owl | Asio otus |
| b Eastern Bluebird | Sialia sialis |
| Loggerhead Shrike | Lanius ludovicianus |

## MAMMALS

| | |
|---|---|
| Water Shrew | Sorex palustris |
| Smokey Shrew | Sorex fumeus |
| Long-tailed Shrew | Sorex dispar |
| Least Shrew | Cryptotis parva |
| Hairy-tailed Mole | Parascalops breweri |
| Star-nosed Mole | Condylura cristata |
| Keen Myotis | Myotis keenii |
| Small-footed Myotis | Myotis sublatus |
| Silver-haired Bat | Lasionycteris noctivagans |
| Eastern Pipistrel | Pipistrellus subflavus |
| Hoary Bat | Lasiurus cinereus |

b = Breeds in New Jersey

[1] Status designation applicable to breeding population only

## UNDETERMINED SPECIES IN NEW JERSEY

| | |
|---|---|
| Southern Flying Squirrel | Glaucomys volans |
| Marsh Rice Rat | Oryzomys palustris |
| Deer Mouse | Peromyscus maniculatus |
| Eastern Wood Rat | Neotoma floridana |
| Southern Bog Lemming | Synaptomys cooperi |
| Meadow Jumping Mouse | Zapus hudsonius |
| Woodland Jumping Mouse | Napaeozapus insignis |
| Bobcat | Lynx rufus |

## MARINE MAMMALS

| | |
|---|---|
| Dense Beaked Whale | Mesoplodon densirostris |
| Gulfstream Beaked Whale | Mesoplodon gervaisi |
| Antillean Beaked Whale | Mesoplodon europaeus |
| True's Beaked Whale | Mesoplodon mirus |
| Cuvier's Beaked Whale | Ziphius cavirostris |
| Pygmy Sperm Whale | Kogia breviceps |
| Dwarf Sperm Whale | Kogia simus |
| Cuvier Dolphin | Stenella frontalis |
| Spotted Dolphin | Stenella plagiodon |
| Striped Dolphin | Stenella coeruleoalba |
| Common Dolphin | Delphinus delphis |
| Atlantic White-side Dolphin | Lagenorhynchus acutus |
| Atlantic Killer Whale | Orcinus orca |
| Risso's Dolphin | Grampus griseus |
| Long-finned Pilot Whale (Blackfish) | Globicephala melaena |
| Short-finned Pilot Whale | Globicephala macrorhyncus |
| Atlantic Harbor Porpoise | Phocoena phocoena |
| Minke Whale | Balaenoptera acutorostrata |

# EXTIRPATED SPECIES IN NEW JERSEY

## FISH

| | |
|---|---|
| Longnose Gar | Lepisosteus osseus |

## BIRDS

| | |
|---|---|
| b Wilson's Plover | Charadrius wilsonia[1] |
| Eskimo Curlew | Numenius borealis |
| b Northern Parula | Parula americana[1] |

## MARINE MAMMALS

| | |
|---|---|
| Gray Whale | Eschrichtius robustus |

## MAMMALS

| | |
|---|---|
| Gray Wolf | Canis lupus |
| Mountain Lion | Felis concolor |
| Snowshoe Hare | Lepus americanus |

b = Breeds in New Jersey

1 Status designation applicable to breeding population only

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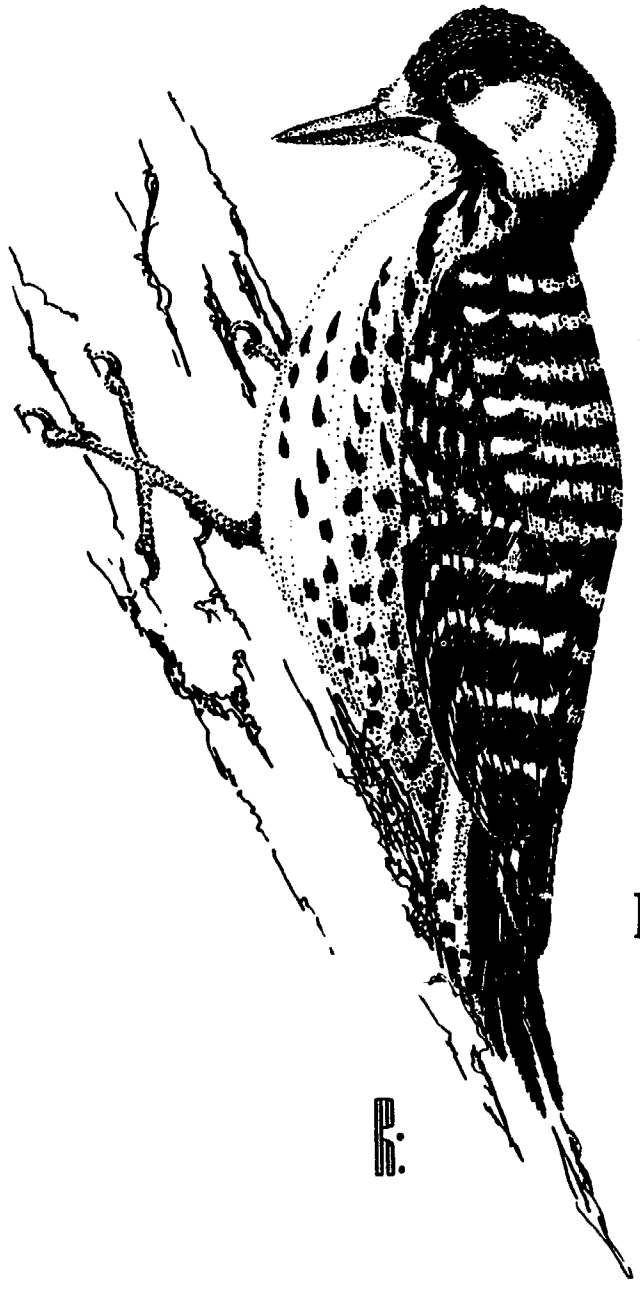


# Endangered and Threatened Wildlife and Plants

## Native to the United States

APPENDIX 5

| COMMON NAME | SCIENTIFIC NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|
| Coqui, golden | Eleutherodactylus jasperi | Puerto Rico | T | Amphibian |
| Salamander, desert slender | Batrachoseps aridus | CA | E | Amphibian |
| Salamander, Red Hills | Phaeognathus hubrichti | AL | T | Amphibian |
| Salamander, San Marcos | Eurycea nana | TX | T | Amphibian |
| Salamander, Santa Cruz long-toed | Ambystoma macrodactylum croceum | CA | E | Amphibian |
| Salamander, Texas blind | Typhlomolge rathbuni | TX | E | Amphibian |
| Toad, Houston | Bufo houstonensis | TX | E | Amphibian |
| Treefrog, pine barrens | Hyla andersonii | FL | E | Amphibian |
| Akepa, Hawaii (honeycreeper) | Loxops coccinea coccinea | HI | E | Bird |
| Akepa, Maui (honeycreeper) | Loxops coccinea ochracea | HI | E | Bird |
| Akialoa, Kuai (honeycreeper) | Hemignathus procerus | HI | E | Bird |
| Akipolaau (honeycreeper) | Hemignathus wilsoni | HI | E | Bird |
| Blackbird, yellow-shouldered | Agelaius xanthomus | Puerto Rico | E | Bird |
| Bobwhite, masked (quail) | Colinus virginianus ridgwayi | AZ | E | Bird |
| Condor, California | Gymnogyps californianus | CA,OR | E | Bird |
| Coot, Hawaiian | Fulica americana alai | HI | E | Bird |
| Crane, Mississippi sandhill | Grus canadensis pulla | MS | E | Bird |
| Crane, whooping | Grus americana | Great Plains and Rocky Mt. States | E | Bird |
| Creeper, Hawaiian | Loxops maculata mana | HI | E | Bird |
| Creeper, Molokai (=Kakawahie) | Loxops maculata flammea | HI | E | Bird |
| Creeper, Oahu (=alauwahio) | Loxops maculata maculata | HI | E | Bird |
| Crow, Hawaiian (=alala) | Corvus tropicus | HI | E | Bird |
| Curlew, Eskimo | Numenius borealis | AK and Northern Canada through Southern U.S. | E | Bird |
| Dove, Palau ground | Gallicolumba canifrons | Palau Is. | E | Bird |
| Duck, Hawaiian (=koloa) | Anas wyvilliana | HI | E | Bird |
| Duck, Laysan | Anas laysanensis | HI | E | Bird |
| Eagle, bald | Haliaeetus leucocephalus | 48 conterminous States except WA,OR,MN,WI,MI | E | Bird |
| Eagle, bald | Haliaeetus leucocephalus | WA,OR,MN,WI,MI | T | Bird |
| Falcon, American peregrine | Falco peregrinus anatum | All States | E | Bird |
| Falcon, Arctic peregrine | Falco peregrinus tundrius | All States except HI | E | Bird |
| Finch, Laysan (honeycreeper) | Telespyza (=Psittirostra) cantans | HI | E | Bird |
| Finch, Nihoa (honeycreeper) | Telespyza (=Psittirostra) ultima | HI | E | Bird |
| Flycatcher, Palau fantail | Rhipidura lepida | Palau Is. | E | Bird |
| Flycatcher, Tinian monarch | Monarcha takatsukasae | Marianas Is. | E | Bird |
| Gallinule, Hawaiian | Gallinula chloropus sandvicensis | HI | E | Bird |
| Goose, Aleutian Cananda | Branta canadensis leucopareia | AK,CA,OR,WA | E | Bird |
| Goose, Hawaiian (=Nene) | Branta sandvicensis | HI | E | Bird |
| Hawk, Hawaiian (=io) | Buteo solitarius | HI | E | Bird |
| Honeycreeper, crested (=akohekohe) | Palmeria dolei | HI | E | Bird |
| Kite, Everglade (snail kite) | Rostrhamus sociabilis plumbeus | FL | E | Bird |

| COMMON NAME | SCIENTIFIC NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|
| Mallard, Marianas | Anas oustaleti | Guam, Marianas Is. | E | Bird |
| Megapode, La Perouse's | Megapodius laperouse | Palau Is., Marianas Is. | E | Bird |
| Millerbird, Nihoa (willow warbler) | Acrocephalus familiaris kingi | HI | E | Bird |
| Nukupuu (honeycreeper) | Hemignathus lucidus | HI | E | Bird |
| Oo, Kauai (=Oo Aa) (honeyeater) | Moho braccatus | HI | E | Bird |
| Ou, (honeycreeper) | Psittirostra psittacea | HI | E | Bird |
| Owl, Palau | Otus podargina | Palau Is. | E | Bird |
| Palila (honeycreeper) | Psittirostra bailleui | HI | E | Bird |
| Parrot, Puerto Rican | Amazona vittata | Puerto Rico | E | Bird |
| Parrotbill, Maui (honeycreeper) | Pseudonestor xanthophrys | HI | E | Bird |
| Pelican, brown | Pelecanus occidentalis | Carolinas to TX, CA | E | Bird |
| Petrel, Hawaiian dark-rumped | Pterodroma phaeopygia sandwichensis | HI | E | Bird |
| Pigeon, Puerto Rican plain | Columba inornata wetmorei | Puerto Rico | E | Bird |
| Poo-uli | Melamprosops phaeosoma | HI | E | Bird |
| Prairie chicken, Attwater's greater | Tympanuchus cupido attwateri | TX | E | Bird |
| Rail, California clapper | Rallus longirostris obsoletus | CA | E | Bird |
| Rail, light-footed clapper | Rallus longirostris levipes | CA | E | Bird |
| Rail, Yuma clapper | Rallus longirostris yumanensis | AZ,CA | E | Bird |
| Shearwater, Newell's Manx | Puffinus puffinus newelli | HI | T | Bird |
| Shrike, San Clemente loggerhead | Lanius ludovicianus mearnsi | CA | E | Bird |
| Sparrow, Cape Sable seaside | Ammospiza maritima mirabilis | FL | E | Bird |
| Sparrow, dusky seaside | Ammospiza maritima nigrescens | FL | E | Bird |
| Sparrow, San Clemente sage | Amphispiza belli clementeae | CA | T | Bird |
| Sparrow, Santa Barbara song | Melospiza melodia graminea | CA | E | Bird |
| Starling, Ponape mountain | Aplonis pelzelni | Caroline Is. | E | Bird |
| Stilt, Hawaiian | Himantopus himantopus knudseni | HI | E | Bird |
| Tern, California least | Sterna albifrons browni | CA | E | Bird |
| Thrush, large Kauai | Phaeornis obscurus myadestina | HI | E | Bird |
| Thrush, Molokai (=olomau) | Phaeornis obscurus rutha | HI | E | Bird |
| Thrush, small Kauai (=puaiohi) | Phaeornis palmeri | HI | E | Bird |
| Warbler (wood), Bachman's | Vermivora bachmanii | Southeastern U.S. | E | Bird |
| Warbler (wood), Kirtland's | Dendrocia kirtlandii | MI | E | Bird |
| Warbler, (willow), reed | Acrocephalus luscinia | Marianas Is. | E | Bird |
| Whip-poor-will, Puerto Rican | Caprimulgus noctitherus | Puerto Rico | E | Bird |
| White-eye, Ponape great | Rukia longirostra (=sanfordi) | Caroline Is. | E | Bird |
| Woodpecker, ivory-billed | Campephilus principalis | Southcentral and Southeastern U.S. | E | Bird |
| Woodpecker, red-cockaded | Picoides (=Dendrocopos) borealis | Southcentral and Southeastern U.S. | E | Bird |
| Pearly mussel, Alabama lamp | Lampsilis virescens | AL,TN | E | Clam |
| Pearly mussel, Appalachian monkeyface | Quadrula sparsa | TN,VA | E | Clam |
| Pearly mussel, birdwing | Conradilla caelata | TN,VA | E | Clam |

| COMMON NAME | SCIENTIFIC NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|
| Pearly mussel, Cumberland bean | Villosa (=Micromya) trabalis | KY | E | Clam |
| Pearly mussel, Cumberland monkeyface | Quadrula intermedia | AL,TN,VA | E | Clam |
| Pearly mussel, Curtis' | Epioblasma (=Dysnomia) florentina gubernaculum | MO | E | Clam |
| Pearly mussel, dromedary | Dromus dromas | TN,VA | E | Clam |
| Pearly mussel, green-blossom | Epioblasma (=Dysnomia) torulosa gubernaculum | TN,VA | E | Clam |
| Pearly mussel, Higgin's eye | Lampsilis higginsi | IL,IA,MN,MO,NE,WI | E | Clam |
| Pearly mussel, orange-footed | Plethobasis cooperianus | AL,IN,IA,KY,OH,PA,TN | E | Clam |
| Pearly mussel, pale lilliput | Toxolasma (=Carunculina) cylindrella | AL,MO,TN,WV | E | Clam |
| Pearly mussel, pink mucket | Lampsilis orbiculata | AL,IL,IN,KY,MO,OH,PA,TN,WV | E | Clam |
| Pearly mussel, Sampson's | Epioblasma (=Dysnomia) sampsoni | IL,IN | E | Clam |
| Pearly mussel, tubercled-blossom | Epioblasma (=Dysnomia) torulosa torulosa | IL,KY,TN,WV | E | Clam |
| Pearly mussel, turgid-blossom | Epioblasma (=Dysnomia) turgidula | AL,AR,MO,TN | E | Clam |
| Pearly mussel, white cat's eye | Epioblasma (=Dysnomia) sulcata delicata | IN,MI,OH | E | Clam |
| Pearly mussel, white wartyback | Plethobasis circatricosus | AL,TN | E | Clam |
| Pearly mussel, yellow-blossom | Epioblasma (=Dysnomia) florentina florentina | AL,TN | E | Clam |
| Pigtoe, fine-rayed | Fusconaia cuneolus | AL,TN,VA | E | Clam |
| Pigtoe, rough | Pleurobema plenum | KY,TN,VA | E | Clam |
| Pigtoe, shiny | Fusconaia edgariana | AL,TN,VA | E | Clam |
| Pocketbook, fat | Potamilus (=Proptera) capax | AR,IN,MO,OH | E | Clam |
| Riffle shell, tan | Epioblasma walkeri | KY,TN,VA | E | Clam |
| Isopod, Socorro | Thermosphaeroma thermophilus | NM | E | Crustacean |
| Bonytail, Pahranagat | Gila robusta jordani | NV | E | Fish |
| Cavefish, Alabama | Speoplatyrhinus poulsoni | AL | T | Fish |
| Chub, bonytail | Gila elegans | AZ,CA,CO,NV,UT,WY | E | Fish |
| Chub, Borax Lake | Gila boraxobius | OR | E | Fish |
| Chub, humpback | Gila cypha | AZ,CO,UT,WY | E | Fish |
| Chub, Mohave | Gila mohavensis | CA | E | Fish |
| Chub, slender | Hybopsis cahni | TN,VA | T | Fish |
| Chub, spotfin | Hybopsis monacha | AL,GA,NC,TN,VA | T | Fish |
| Cisco, longjaw | Coregonus alpenae | Lakes Michigan,Huron,Erie | E | Fish |
| Cui-ui | Chasmistes cujus | NV | E | Fish |
| Dace, Kendall Warm Springs | Rhinichthys osculus thermalis | WY | E | Fish |
| Dace, Moapa | Moapa coriacea | NV | E | Fish |
| Darter, bayou | Etheostoma rubrum | MS | T | Fish |
| Darter, fountain | Etheostoma fonticola | TX | E | Fish |
| Darter, leopard | Percina pantherina | AR,OK | T | Fish |
| Darter, Maryland | Etheostoma sellare | MD | E | Fish |
| Darter, Okaloosa | Etheostoma okaloosae | FL | E | Fish |
| Darter, slackwater | Etheostoma boschungi | AL,TN | T | Fish |
| Darter, snail | Percina tanasi | TN | E | Fish |

| COMMON NAME | SCIENTIFIC NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|
| Darter, watercress | Etheostoma nuchale | AL | E | Fish |
| Gambusia, Big Bend | Gambusia gaigei | TX | E | Fish |
| Gambusia, Clear Creek | Gambusia heterochir | TX | E | Fish |
| Gambusia, Goodenough | Gambusia amistadensis | TX | E | Fish |
| Gambusia, Pecos | Gambusia nobilis | NM,TX | E | Fish |
| Gambusia, San Marcos | Gambusia georgei | TX | E | Fish |
| Killifish, Pahrump | Empetrichthys latos | NV | E | Fish |
| Madtom, Scioto | Noturus trautmani | OH | E | Fish |
| Madtom, yellowfin | Noturus flavipinnis | GA,TN,VA | T | Fish |
| Pike, blue | Stizostedion vitreum glaucum | Lakes Erie, Ontario | E | Fish |
| Pupfish, Comanche Springs | Cyprinodon elegans | TX | E | Fish |
| Pupfish, Devil's Hole | Cyprinodon diabolis | NV | E | Fish |
| Pupfish, Leon Springs | Cyprinodon bovinus | TX | E | Fish |
| Pupfish, Owens River | Cyprinodon radiosus | CA | E | Fish |
| Pupfish, Tecopa | Cyprinodon nevadensis calidae | CA | E | Fish |
| Pupfish, Warm Springs | Cyprinodon nevadensis pectoralis | NV | E | Fish |
| Squawfish, Colorado River | Ptychocheilus lucius | AZ,CA,CO,NM,NV,UT,WY | E | Fish |
| Stickleback, unarmored threespine | Gasterosteus aculeatus williamsoni | CA | E | Fish |
| Sturgeon, shortnose | Acipenser brevirostrum | Atlantic coast of U.S | E | Fish |
| Topminnow, Gila | Poeciliopsis occidentalis | AZ,NM | E | Fish |
| Trout, Arizona | Salmo apache | AZ | T | Fish |
| Trout, Gila | Salmo gilae | NM | E | Fish |
| Trout, greenback cutthroat | Salmo clarki stomias | CO | T | Fish |
| Trout, Lahontan cutthroat | Salmo clarki henshawi | CA,NV | T | Fish |
| Trout, Little Kern golden | Salmo aguabonita whitei | CA | T | Fish |
| Trout, Paiute cutthroat | Salmo clarki seleniris | CA | T | Fish |
| Woundfin | Plagopterus argentissimus | AZ,NV,UT | E | Fish |
| Beetle, Delta green ground | Elaphrus viridis | CA | T | Insect |
| Beetle, valley elderberry longhorn | Desmocerus californicus dimorphus | CA | T | Insect |
| Butterfly, Bahama swallowtail | Papilio andraemon bonhotei | FL | T | Insect |
| Butterfly, El Segundo blue | Euphilotes (Shijimiaeoides) battoides allyni | CA | E | Insect |
| Butterfly, Lange's metalmark | Apodemia mormo langei | CA | E | Insect |
| Butterfly, Lotis blue | Lycaeides argyrognomon lotis | CA | E | Insect |
| Butterfly, mission blue | Icaricia icarioides missionensis | CA | E | Insect |
| Butterfly, Oregon silverspot | Speyeria zerene hippolyta | OR,WA | T | Insect |
| Butterfly, Palos Verdes blue | Glaucopsyche lygdamus palosverdesensis | CA | E | Insect |
| Butterfly, San Bruno elfin | Callophrys mossii bayensis | CA | E | Insect |
| Butterfly, Schaus swallowtail | Papilio aristodemus ponceanus | FL | T | Insect |
| Butterfly, Smith's blue | Euphilotes (=Shijimiaeoides) enoptes smithi | CA | E | Insect |
| Moth, Kern primrose sphinx | Euproserpinus euterpe | CA | T | Insect |

| COMMON NAME | SCIENTIFIC NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|
| Bat, gray | Myotis grisescens | Central and Southeastern U.S. | E | Mammal |
| Bat, Hawaiian hoary | Lasiurus cinereus semotus | HI | E | Mammal |
| Bat, Indiana | Myotis sodalis | East and Midwestern U.S. | E | Mammal |
| Bat, Ozark big-eared | Plecotus townsendii ingens | MO,OK,AR | E | Mammal |
| Bat, Virginia big-eared | Plecotus townsendii virginianus | KY,WV,VA,IN,IL,OH | E | Mammal |
| Bear, brown or grizzly | Ursus arctos horribilis | 48 conterminous States | T | Mammal |
| Cougar, eastern | Felis concolor cougar | Eastern U.S. | E | Mammal |
| Deer, Columbian white-tailed | Odocoileus virginianus leucurus | OR,WA | E | Mammal |
| Deer, key | Odocoileus virginianus clavium | FL | E | Mammal |
| Dugong | Dugong dugon | U.S. Trust Territories | E | Mammal |
| Ferret, black-footed | Mustela nigripes | Western U.S. | E | Mammal |
| Fox, San Joaquin kit | Vulpes macrotis mutica | CA | E | Mammal |
| Jaguarundi | Felis yagouaroundi cacomitli | TX | E | Mammal |
| Jaguarundi | Felis yagouaroundi tolteca | AZ | E | Mammal |
| Manatee, West Indian (Florida) | Trichechus manatus | Southeastern U.S. | E | Mammal |
| Mouse, salt marsh harvest | Reithrodontomys raviventris | CA | E | Mammal |
| Otter, southern sea | Enhydra lutris nereis | WA south to Mexico | T | Mammal |
| Panther, Florida | Felis concolor coryi | LA and AR east to SC and FL | E | Mammal |
| Prairie Dog, Utah | Cynomys parvidens | UT | E | Mammal |
| Pronghorn, Sonoran | Antilocapra americana sonoriensis | AZ | E | Mammal |
| Rat, Morro Bay kangaroo | Dipodomys heermanni morroensis | CA | E | Mammal |
| Seal, Carribbean monk | Monachus tropicalis | Gulf of Mexico | E | Mammal |
| Seal, Hawaiian monk | Monachus schauinslandi | HI | E | Mammal |
| Squirrel, Delmarva Peninsula fox | Sciurus niger cinereus | MD,VA,DE | E | Mammal |
| Whale, blue | Balaenoptera musculus | Oceanic | E | Mammal |
| Whale, bowhead | Balaena mysticetus | Oceanic | E | Mammal |
| Whale, finback | Balaenoptera physalus | Oceanic | E | Mammal |
| Whale, gray | Eschrichtius gibbosus | Oceanic | E | Mammal |
| Whale, humpback | Megaptera novaeangliae | Oceanic | E | Mammal |
| Whale, right | Eubalaena spp. | Oceanic | E | Mammal |
| Whale, Sei | Balaenoptera borealis | Oceanic | E | Mammal |
| Whale, sperm | Physeter catodon | Oceanic | E | Mammal |
| Wolf, gray | Canis lupus | 48 conterminous States, other than MN | E | Mammal |
| Wolf, gray | Canis lupus | MN | T | Mammal |
| Wolf, red | Canis rufus | Southeast U.S. west to TX | E | Mammal |
| Alligator, American | Alligator mississippiensis | Southeastern U.S. except FL,GA,LA,SC,TX | E | Reptile |
| Alligator, American | Alligator mississippiensis | FL,GA,LA,SC,TX | T | Reptile |
| Alligator, American | Alligator mississippiensis | 12 parishes in LA | T(s/a) | Reptile |
| Anole, Culebra giant | Anolis roosevelti | Puerto Rico: Culebra Is. | E | Reptile |
| Boa, Mona | Epicrates monensis monensis | Puerto Rico | T | Reptile |

| COMMON NAME | SCIENTIFIC NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|
| Boa, Puerto Rican | Epicrates inornatus | Puerto Rico | E | Reptile |
| Boa, Virgin Islands tree | Epicrates monensis granti | U.S. Virgin Is. | E | Reptile |
| Crocodile, American | Crocodylus acutus | FL | E | Reptile |
| Iguana, Mona ground | Cyclura stejnegeri | Puerto Rico: Mona Is. | T | Reptile |
| Lizard, blunt-nosed leopard | Crotaphytus silus | CA | E | Reptile |
| Lizard, Coachella Valley fringe-toed | Uma inornata | CA | T | Reptile |
| Lizard, island night | Klauberina riversiana | CA | T | Reptile |
| Lizard, St. Croix ground | Ameiva polops | U.S. Virgin Is. | E | Reptile |
| Rattlesnake, New Mexican ridgenosed | Crotalus willardi obscurus | NM | T | Reptile |
| Snake, Atlantic salt marsh | Nerodia fasciata taeniata | FL | T | Reptile |
| Snake, eastern indigo | Drymarchon corais couperi | AL,FL,GA,MS,SC | T | Reptile |
| Snake, San Francisco garter | Thamnophis sirtalis tetrataenia | CA | E | Reptile |
| Tortoise, Desert (Beaver Dam Slope) | Gopherus agassizii | UT | T | Reptile |
| Turtle, green sea | Chelonia mydas | Tropic and temperate seas (except Florida) | T | Reptile |
| Turtle, green sea | Chelonia mydas | FL | E | Reptile |
| Turtle, hawksbill sea (=carey) | Eretmochelys imbricata | Tropic seas | E | Reptile |
| Turtle, Kemp's Ridley sea | Lepidochelys kempii | Tropic and temperate seas | E | Reptile |
| Turtle, leatherback sea | Dermochelys coriacea | Tropic, temperate, and subpolar seas | E | Reptile |
| Turtle, loggerhead sea | Caretta caretta | Tropic and temperate seas | T | Reptile |
| Turtle, Olive (Pacific) Ridley sea | Lepidochelys olivacea | Tropic and temperate seas | T | Reptile |
| Turtle, Plymouth red-bellied | Chrysemys (=Pseudemys) rubriventris bangsi | MA | E | Reptile |
| Snail, Chittenango ovate amber | Succinea chittenangoensis | NY | T | Snail |
| Snail, flat-spired three-toothed | Triodopsis platysayoides | WV | T | Snail |
| Snail, Iowa Pleistocene | Discus macclintocki | IA | E | Snail |
| Snail, noonday | Mesodon clarki nantahala | NC | T | Snail |
| Snail, painted snake coiled forest | Anguispira picta | TN | T | Snail |
| Snail, Stock Island | Orthalicus reses | FL | T | Snail |
| Snail, Virginia fringed mountain | Polygyriscus virginianus | VA | E | Snail |

| COMMON NAME | SCIENTIFIC NAME | FAMILY NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|---|
| Bunched arrowhead | Sagittaria fasciculata | Alismataceae | NC,SC | E | Plant |
| Tennessee purple coneflower | Echinacea tennesseensis | Asteraceae | TN | E | Plant |
| --- | Lipochaeta venosa | Asteraceae | HI | E | Plant |
| Truckee barberry | Berberis sonnei | Berberidaceae | CA | E | Plant |
| Virginia round-leaf birch | Betula uber | Betulaceae | VA | E | Plant |
| McDonald's rock-cress | Arabis mcdonaldiana | Brassicaceae | CA,OR | E | Plant |
| Contra Costa wallflower | Erysimum capitatum var. angustatum | Brassicaceae | CA | E | Plant |
| Tobusch fishhook cactus | Ancistrocactus tobuschii | Cactaceae | TX | E | Plant |
| Nellie cory cactus | Coryphantha minima | Cactaceae | TX | E | Plant |
| Bunched cory cactus | Coryphantha ramillosa | Cactaceae | TX | T | Plant |
| Lee pincushion cactus | Coryphantha sneedii var. leei | Cactaceae | NM | T | Plant |
| Sneed pincushion cactus | Coryphantha sneedii var. sneedii | Cactaceae | TX,NM | E | Plant |
| Nichol's Turk's head cactus | Echinocactus horizonthalonius var. nicholii | Cactaceae | AZ | E | Plant |
| Purple-spined hedgehog cactus | Echinocereus engelmannii var. purpureus | Cactaceae | UT | E | Plant |
| Kuenzler hedgehog cactus | Echinocereus kuenzleri | Cactaceae | NM | E | Plant |
| Lloyd's hedgehog cactus | Echinocereus lloydii | Cactaceae | TX | E | Plant |
| Black lace cactus | Echinocereus reichenbachii var. albertii | Cactaceae | TX | E | Plant |
| Spineless hedgehog cactus | Echinocereus triglochidiatus var. inermis | Cactaceae | CO,UT | E | Plant |
| Arizona hedgehog cactus | Echinocereus triglochidiatus var. arizonicus | Cactaceae | AZ | E | Plant |
| Davis' green pitaya | Echinocereus viridiflorus var. davisii | Cactaceae | TX | E | Plant |
| Lloyd's Mariposa cactus | Neolloydia mariposensis | Cactaceae | TX | T | Plant |
| Brady pincushion cactus | Pediocactus bradyi | Cactaceae | AZ | E | Plant |
| Knowlton cactus | Pediocactus knowltonii | Cactaceae | NM | E | Plant |
| Peebles Navajo cactus | Pediocactus peeblesianus var. peeblesianus | Cactaceae | AZ | E | Plant |
| Silver pincushion cactus | Pediocactus sileri | Cactaceae | AZ,UT | E | Plant |
| Uinta Basin hookless cactus | Sclerocactus glaucus | Cactaceae | CO,UT | T | Plant |
| Mesa Verde cactus | Sclerocactus mesae-verdae | Cactaceae | CO,NM | T | Plant |
| Wright fishhook cactus | Sclerocactus wrightiae | Cactaceae | UT | E | Plant |
| Santa Barbara Island liveforever | Dudleya traskiae | Crassulaceae | CA | E | Plant |
| Raven's manzanita | Arctostaphylos hookeri ssp. ravenii | Ericaceae | CA | E | Plant |
| Chapman rhododendron | Rhododendron chapmanii | Ericaceae | FL | E | Plant |
| Rydberg milk-vetch | Astragalus perianus | Fabacea. | UT | T | Plant |
| Osgood Mountains milk-vetch | Astragalus yoder-williamsii | Fabaceae | ID,NV | E | Plant |
| Hairy rattleweed | Baptisia arachnifera | Fabaceae | GA | E | Plant |
| San Clemente broom | Lotus scoparius ssp. traskiae | Fabaceae | CA | E | Plant |
| Hawaiian wild broad-bean | Vicia menziesii | Fabaceae | HI | E | Plant |
| clay phacelia | Phacelia argillacea | Hydrophyllaceae | UT | E | Plant |
| --- | Haplostachys haplostachya var. angustifolia | Lamiaceae | HI | E | Plant |
| San Diego mesa mint | Pogogyne abramsii | Lamiaceae | CA | E | Plant |
| --- | Stenogyne angustifolia var. angustifolia | Lamiaceae | HI | E | Plant |

| COMMON NAME | SCIENTIFIC NAME | FAMILY NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|---|
| Harper's beauty | Harperocallis flava | Liliaceae | FL | E | Plant |
| Persistent trillium | Trillium persistens | Liliaceae | GA,SC | E | Plant |
| Cooke's kokio | Kokia cookei | Malvaceae | HI | E | Plant |
| San Clemente Island bush-mallow | Malacothamnus clementinus | Malvaceae | CA | E | Plant |
| MacFarlane's four-o'clock | Mirabilis macfarlanei | Nyctaginaceae | ID,OR | E | Plant |
| Eureka evening-primrose | Oenothera avita ssp. eurekensis | Onagraceae | CA | E | Plant |
| Antioch Dunes evening-primrose | Oenothera deltoides ssp. howellii | Onagraceae | CA | E | Plant |
| Dwarf bear-poppy | Arctomecon humilis | Papaveraceae | UT | E | Plant |
| Solano grass (=Crampton's Orcutt) | Orcuttia mucronata | Poaceae | CA | E | Plant |
| Eureka Dune grass | Swallenia alexandrae | Poaceae | CA | E | Plant |
| Texas wild-rice | Zizania texana | Poaceae | TX | E | Plant |
| Northern wild monkshood | Aconitum noveboracense | Ranunculaceae | IA,NY,OH, WI | T | Plant |
| San Clemente Is. larkspur | Delphinium kinkiense | Ranunculaceae | CA | E | Plant |
| Robbins' cinquefoil | Potentilla robbinsiana | Rosaceae | NH | E | Plant |
| Green pitcher plant | Sarracenia oreophila | Sarraceniaceae | AL,GA | E | Plant |
| San Clemente Is. Indian paintbrush | Castilleja grisea | Scrophulariaceae | CA | E | Plant |
| Salt marsh bird's beak | Cordylanthus maritimus ssp. maritimus | Scrophulariaceae | CA | E | Plant |
| Furbish lousewort | Pedicularis furbishiae | Scrophulariaceae | ME | E | Plant |

* Some of the species are found in other countries; this list includes only species native to the United States and its territories.

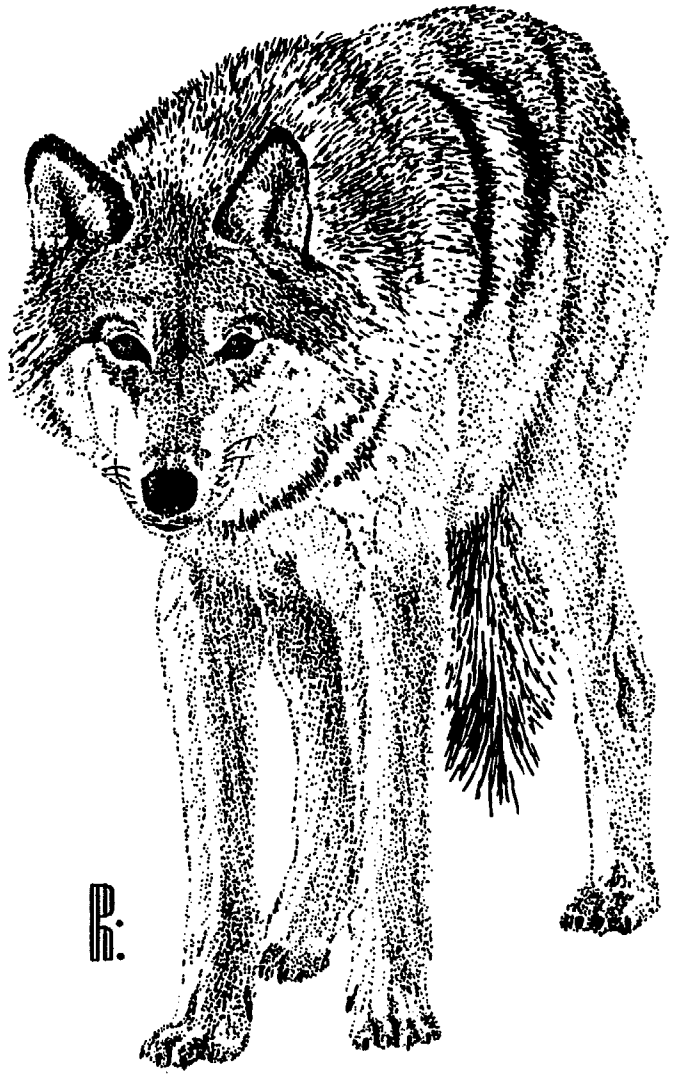
** E = Endangered; T = Threatened; T(s/a) = Threatened by similarity of appearance.

This is current as of October 1, 1980. For information on additions to this list contact: Office of Endangered Species, U.S. Fish & Wildlife Service, Department of the Interior, Washington, D.C. 20240 (703/235-1975).

| COMMON NAME | SCIENTIFIC NAME | STATE* | STATUS** | GROUP |
|---|---|---|---|---|
| Mallard, Marianas | Anas oustaleti | Guam, Marianas Is. | E | Bird |
| Megapode, La Perouse's | Megapodius laperouse | Palau Is. Marianas Is. | E | Bird |
| Millerbird, Nihoa (willow warbler) | Acrocephalus familiaris kingi | HI | E | Bird |
| Nukupuu (honeycreeper) | Hemignathus lucidus | HI | E | Bird |
| Oo, Kauai (=Oo Aa) (honeyeater) | Moho braccatus | HI | E | Bird |
| Ou, (honeycreeper) | Psittirostra psittacea | HI | E | Bird |
| Owl, Palau | Otus podargina | Palau Is. | E | Bird |
| Palila (honeycreeper) | Psittirostra bailleui | HI | E | Bird |
| Parrot, Puerto Rican | Amazona vittata | Puerto Rico | E | Bird |
| Parrotbill, Maui (honeycreeper) | Pseudonestor xanthophrys | HI | E | Bird |
| Pelican, brown | Pelecanus occidentalis | Carolinas to TX, CA | E | Bird |
| Petrel, Hawaiian dark-rumped | Pterodroma phaeopygia sandwichensis | HI | E | Bird |
| Pigeon, Puerto Rican plain | Columba inornata wetmorei | Puerto Rico | E | Bird |
| Poo-uli | Melamprosops phaeosoma | HI | E | Bird |
| Prairie chicken, Attwater's greater | Tympanuchus cupido attwateri | TX | E | Bird |
| Rail, California clapper | Rallus longirostris obsoletus | CA | E | Bird |
| Rail, light-footed clapper | Rallus longirostris levipes | CA | E | Bird |
| Rail, Yuma clapper | Rallus longirostris yumanensis | AZ,CA | E | Bird |
| Shearwater, Newell's Manx | Puffinus puffinus newelli | HI | T | Bird |
| Shrike, San Clemente loggerhead | Lanius ludovicianus mearnsi | CA | E | Bird |
| Sparrow, Cape Sable seaside | Ammospiza maritima mirabilis | FL | E | Bird |
| Sparrow, dusky seaside | Ammospiza maritima nigrescens | FL | E | Bird |
| Sparrow, San Clemente sage | Amphispiza belli clementeae | CA | T | Bird |
| Sparrow, Santa Barbara song | Melospiza melodia graminea | CA | E | Bird |
| Starling, Ponape mountain | Aplonis pelzelni | Caroline Is. | E | Bird |
| Stilt, Hawaiian | Himantopus himantopus knudseni | HI | E | Bird |
| Tern, California least | Sterna albifrons browni | CA | E | Bird |
| Thrush, large Kauai | Phaeornis obscurus myadestina | HI | E | Bird |
| Thrush, Molokai (=olomau) | Phaeornis obscurus rutha | HI | E | Bird |
| Thrush, small Kauai (=puaiohi) | Phaeornis palmeri | HI | E | Bird |
| Warbler (wood), Bachman's | Vermivora bachmanii | Southeastern U.S. | E | Bird |
| Warbler (wood), Kirtland's | Dendrocia kirtlandii | MI | E | Bird |
| Warbler, (willow), reed | Acrocephalus luscinia | Marianas Is. | E | Bird |
| Whip-poor-will, Puerto Rican | Caprimulgus noctitherus | Puerto Rico | E | Bird |
| White-eye, Ponape great | Rukia longirostra (=sanfordi) | Caroline Is. | E | Bird |
| Woodpecker, ivory-billed | Campephilus principalis | Southcentral and Southeastern U.S. | E | Bird |
| Woodpecker, red-cockaded | Picoides (=Dendrocopos) borealis | Southcentral and Southeastern U.S. | E | Bird |
| Pearly mussel, Alabama lamp | Lampsilis virescens | AL,TN | E | Clam |
| Pearly mussel, Appalachian monkeyface | Quadrula sparsa | TN,VA | E | Clam |
| Pearly mussel, birdwing | Conradilla caelata | TN,VA | E | Clam |

# DEPARTMENT OF THE INTERIOR
## U.S. FISH AND WILDLIFE SERVICE

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



# E A S E M E N T

THIS AGREEMENT, made the day of 1977

BETWEEN

hereinafter referred to as GRANTORS,

AND THE STATE OF NEW JERSEY, DEPARTMENT OF ENVIRONMENTAL PROTECTION, with its principal office in the Labor and Industry Building, Trenton, New Jersey

hereinafter referred to as GRANTEE,

WHEREAS, GRANTORS are the owners of certain lands hereinafter described located in the Township of County of Somerset, State of New Jersey, and which lands are located within a project known as the Millstone River Project, No. 23, which project is being undertaken by the GRANTEE.

WHEREAS, GRANTEE desires to acquire a recreational easement in, over and through lands owned by GRANTORS for the purpose and to the extent hereinafter more particularly described;

NOW THEREFORE, in consideration of the sum of

the receipt of which is hereby acknowledged, GRANTORS, for themselves, their heirs, executors, administrators, successors and assigns, do hereby grant, bargain, sell, transfer and convey, to GRANTEE, its successors and assigns, a perpetual easement, in, over and through the lands hereinafter described for the following uses and purposes:

a. GRANTEE is granted vehicle access over the within described lands for the purposes of operating and maintaining the lands of the Delaware and Raritan Canal, lands within the Millstone River Project area and the lands involved in this easement.

b. GRANTEE is granted the right to construct recreational trails over the lands herein described for hiking, equestrian use, bicycling or nature studies and to clear trees and stabilize surfaces for use by the public for recreational purposes. GRANTEE is further granted the right to install trail markers or other appropriate signs as deemed necessary by GRANTEE to inform or direct the public in the use of the lands involved in this easement or other recreational State lands in the area.

c. GRANTEE is granted the right to construct bridges, catwalks or other structures to provide continuous trails across wet or swampy areas of the lands involved in this easement.

d. GRANTEE covenants and agrees not to construct buildings or other major structures on the lands involved in this easement without the express approval, in writing, by the GRANTORS.

The lands and premises comprising this Easement are more particularly described as follows:

All that certain tract of land, situate, lying and being in the Township of , County of Somerset, and State of New Jersey, more particularly bounded and described as follows:

The GRANTEE agrees that there shall be no liability upon the GRANTOR arising out of the use of the within land and premises by the GRANTEE, its employees, agents, licensees, contractors, or invitees, and the GRANTEE agrees to indemnify and save harmless the GRANTOR from any liability and from all costs and expense of every kind to which the GRANTOR may be put by reason of any injury or claim of injury to persons or property resulting or arising from the use by the GRANTEE, its employees, agents, licensees, contractors or invitees of the land and premises herein described.

This easement and all of the terms, covenants, provisions and conditions contained herein shall run with the land and shall be binding on the GRANTORS, their heirs, executors, administrators, successors and assigns.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals the date and year first above written.

_____ (L.S.)

WITNESS:

_____ _____ (L.S.)

Approved as to form:

William F. Hyland
Attorney General

By: _____

Deputy Attorney General

STATE OF NEW JERSEY )
) ss:
COUNTY OF )

BE IT REMEMBERED, that on this day of in the year of Our Lord One Thousand Nine Hundred and Seventy-seven, before me, the dubscriber, personally appeared

who, I am satisfied, the mentioned in the within Instrument, and thereupon acknowledged that signed, sealed and delivered the same as act and deed, for the uses and purposes therein expressed, and that the full and actual consideration paid or to be paid for the transfer of title to realty evidenced by the within deed, as such consideration is defined in Chapter 49, Laws of 1968, Sec. 1 (c) is $

_____

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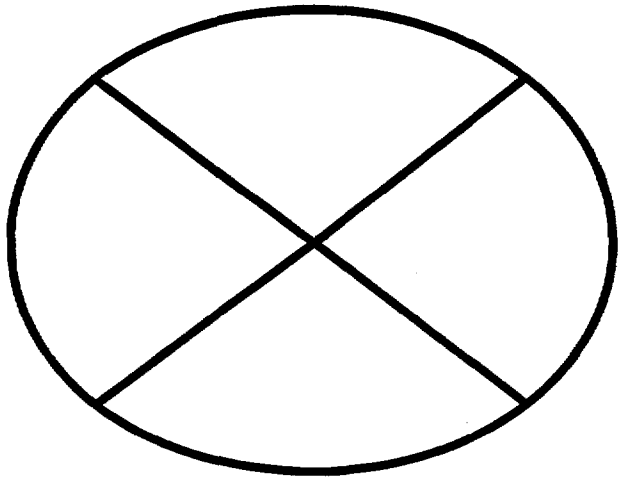

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**Document ID:** Mullica River Estuarine Sanctuary

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